PLANTRONICS

Wilcom

MODEL T308-01A
PCM CHANNEL ACCESS SET
(Including Versions - 02A, -03A and -04A)

900 mo 12 mo

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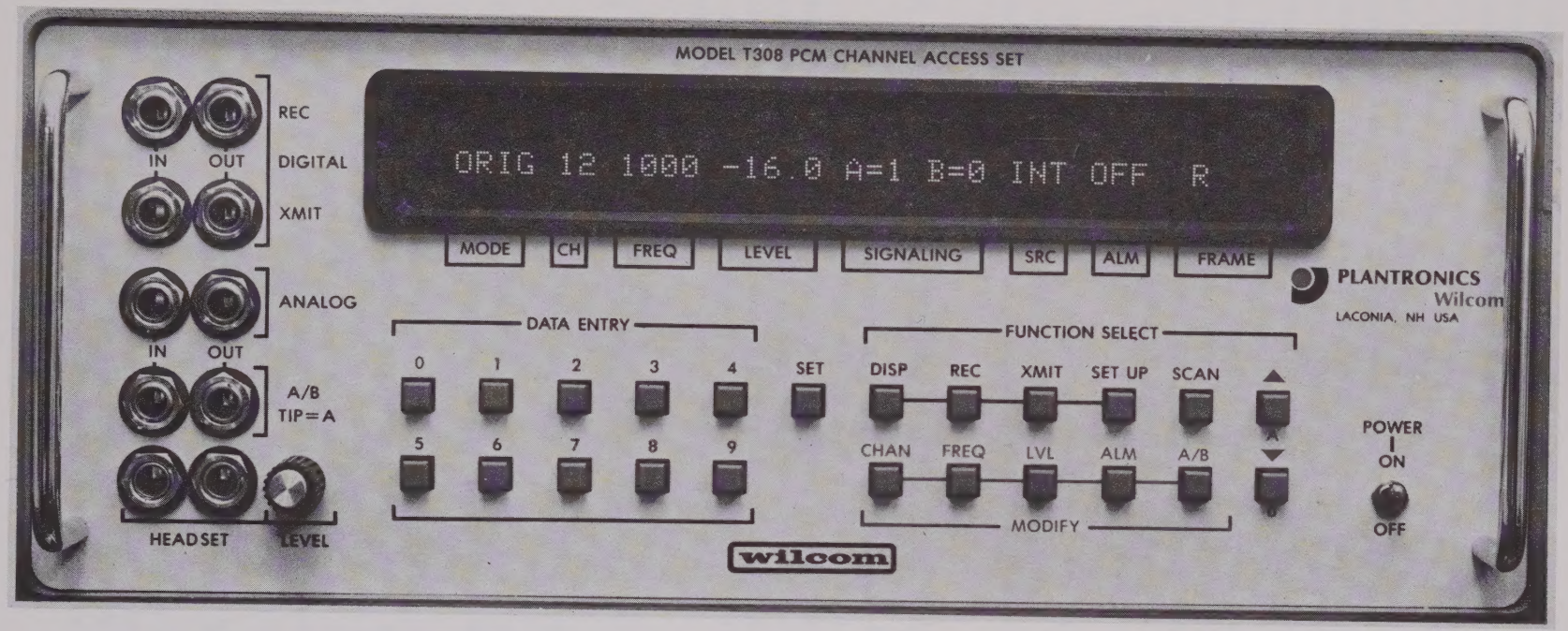


FIGURE 1-1

Model T308 PCM Channel Access Set

1.0 GENERAL

1.1 The Wilcom T308-01A PCM CHANNEL ACCESS SET is a microprocessor controlled instrument designed to simplify testing and alignment of PCM systems operating at a DS1 rate (1.544 MBPS) where per channel conversion to analog is not readily accessible or is not available (i.e., an intermediate office location). The T308-01A will interface with systems employing D1D, D2, D3 and D4 coding with the internal microprocessor assigning the correct timeslot from a given user-input channel number. The set will perform transmit, receive and signaling functions on any one channel in a group of 24. A front panel keyboard allows the user to enter commands and channel numbers with maximum ease. A 40 character fluorescent display presents a clear indication of entered commands and will prompt the user for further information when required to perform the operation. The display also serves to indicate system setup & receive status for either the digital receive input or for the digital output of the T308-01A. V1.3 is displayed at POWER/ON; it refers to Version 1 Revision 3. (See below).

1.2 The Digital Receive and associated jacks, Analog Out and A/B Out, are color-coded blue. The Digital Transmit and associated jacks, Analog In and A/B In, are color-coded red. The Headset jacks can be used for sending and receiving.

1.3 Loop Timing Function (Added by Version 1, Revision 2, V1.2)

1.3.01 The loop timing function allows the user to determine if a system under test is or is not loop timed. An "L" will be displayed in the FRAME section of the display if the two T1 signals (bit streams) are not in phase. The two T1 signals used for comparison are derived from different sources depending on the transmit mode selected. The following table will clarify the timing comparison process:

Transmit Mode	Comparison
Orig	Internal T1 Source vs Digital Rec. Input
D&I	Digital Xmit Input vs Digital Rec. Input
Loop	Digital Xmit Output and Digital Rec. Input always compare in "Loop" mode. Refer to 1.6.02.

The clocks derived from the signals being compared are passed thru a divided by 16 circuit to reduce the effects of line jitter. Consequently, a 16 Hz difference between two T1 signals will be detected in approximately 1 second. Higher or lower difference frequencies will result in a shorter or longer detection time respectively.

1.4 Line Measurement Function (Added by Version 1, Revision 3, V1.3):

(a) Frame Error Count - The T308-01A provides a 4 digit counter for individual framing bit errors. The counter resets automatically when the maximum count (9999) is exceeded and can also be reset from the keyboard. In the presence of

continuous errors (such as from a loss of signal), the counter will advance at approximately a one per second rate. A small box will be displayed next to the count to indicate continuous errors. The counter is useful as an indication of a very high bit error rate, which would affect the framing of the system.

(b) Bipolar Violations - A bipolar violation is defined as a "one" pulse (or mark) which is of the same polarity as the preceding pulse, regardless of whether it was positive or negative. The T308-01A will display the occurence of one or more BPV's as they occur.

(c) Line Jitter - When present in excess, line jitter may cause a repeater section or sections to pass inaccurately regenerated T1 data. While the jitter tolerance requirements of T1 systems are defined by a range of jitter frequencies and amplitudes, the T308-01A presents a go/no-go indication of jitter which has exceeded a predetermined threshold. Refer to the specifications for further information.

1.5 Monitor Incoming & Outgoing Trunks (VF measuremnt via the Analog Out Jack.)

1.5.01 The T308-01A can receive the DS1 signal at a C.O. Repeater, at the line jacks on a terminating (100 ohm) basis, or at the monitor jack on a bridged basis. After the desired channel number is selected the T308-01A begins its digital to analog conversion function for that channel. The T308-01A decoder uses state of the art techniques to provide near ideal gain tracking, signal to distortion and idle channel noise. Because of this the T308-01A has negligible effect on Voice Frequency (VF) measurements made with an external Transmission Measurement Set (TMS). The Analog Out Jack (blue) provides a convenient output for the TMS or other instrument used to measure level or noise. (Refer to Figure 4-2.) An internal monitor speaker (or external headset) may be used to audibly analyze a problem (i.e., a foreign tone present). The display will indicate the selected channel number and the logic state (1 or 0) of the A and B signaling bits. In addition, the A/B output jack provides two independent metallic closures to ground following the A and B states ("0" = open, "1" = ground). The T308-01A will detect suppression of bit 2 in all timeslots in the PCM stream thereby indicating that an alarm has been received from the equipment under test.

1.6 Level Frequency and Offset Measurement (Internally Computed) (Added by Version 1, Revision 1)

1.6.01 The T308-01A can measure level and frequency as well as PCM offset of digital information in any one timeslot by direct computation from the 8 bit timeslot samples. This adds additional precision to the T308-01A.

1.6.02 Level Measurement - The T308-01A measures the level on a user selected channel by computing the actual RMS power of a large number of samples and expressing the result in dB referenced to the AT&T standard digital milliwatt (Ref. PUB 43801). This technique results in a precise measurement which is insensitive to temperature variations and drift with age.

1.6.03 Frequency Measurement - Frequency measurement is performed by extracting frequency information directly from the digital samples. This measurement is independent of PCM Offsets within the system.

1.6.04 PCM Offset Measurement - The T308-01A also provides for the measurement of PCM Offset by computing the average over 1000 timeslot samples. The theoretical average should always be zero for a sine wave but offsets within an operational T-system (in the encoding process) may result in an offset of 10 encoding steps or more. No attempt will be made to define a critical number of steps beyond which corrective action should be taken but the user may find that this function can provide an indication of the relative "health" of a system relative to other systems within the same office. A gross difference in one system (i.e., 20-30 steps) may indicate the need to conduct measurements of noise and distortion in the system by using the T308-01A analog output with appropriate test equipment.

NOTE: Before the Level Measurement Option is selected (Section 6.3.03), the T308-01A should first be setup to decode a selected channel in the normal manner.

1.7 Transmit Modes

1.7.01 The T308-01A PCM Channel Access Set has the capabilities of encoding analog information (Transmit Function) and operating in the Drop and Insert Mode or the Loop Mode allowing channel bank testing and alignment on an individual channel basis.

1.7.02 In the Loop Mode the digital signal is applied to the DIGITAL/REC, IN Jack where the test source, supplied by the T308-01A, is synchronized to an external source such as a digital switching system. Timing is derived from the received bit stream.

1.7.03 In the Drop and Insert Mode the T308-01A is essentially in series with the bit stream and information incoming in a particular timeslot can be removed (DROP) and new information substituted (INSERT) for transmission in that timeslot. All other channels will be passed through without change. In addition to the Loop Mode and the Drop and Insert Mode the T308-01A can be operated in the Originate Mode. The Originate Mode of operation is used to generate a DS-1 bit stream and allows information to be assigned to any of the 24 channels. A programmable test tone synthesizer may be assigned to any of the 24 channels. A programmable test tone synthesizer may be assigned to any channel. In addition, external analog signals applied to the ANALOG IN jack may be assigned to any channel. This would include MF or DTMF signaling sequences. Headset signals may also be encoded and assigned a channel.

1.8 Signaling Bit Monitoring

1.8.01 The microprocessor based design of the T308-01A allows flexible control of the internal decoder and receive logic and provides a "SCAN" command where the signaling bits for all 24 channels in a group are scanned sequentially and the status of the signaling bits of all 24 channels is indicated on the display. Either the A or B bits may be monitored using this function.

1.9 Loss of Power Protection

1.9.01 A provision has been made for a metallic through path during power outage whenever the set is operating in the Drop and Insert Mode. This loss of power protection also provides for return to the Drop and Insert Mode when power is restored.

2.0 SPECIFICATIONS

2.1 Receive

Analog: u255 decoding law
Normal - 7-5/6 bit decoding
CCIS - 8 bit decoding

Output Level: 0 dBm ±0.05 dB with digital milliwatt applied to selected channel.

Output Level vs Frequency: (Referenced to 1000 Hz) ±0.125 dB for 300 <f<3000 Hz.

Gain Tracking Error: (L = output level in dBm)

+0.0 <L≤3.0	±0.1 dB
-40 <L< 0	±0.05 dB
-50 <L< -40	±0.15 dB
-60 ≤L< -50	±0.4 dB

Output Intrinsic Noise: (with forced idle channel code)
<10 dBrnC

Output Impedance: 600 ohm balanced (for use with local measurement equipment such as TMS or RMS voltmeter with balanced input only).

Output TLP: 0.0 dBm
Output Connector: type 310 jack (tip-ring)

Alarm Detection: bit 2 = 0 in all channels will produce an alarm display if present for greater than 5 frames.

dc Output:
A or B Outputs: (assume that logic "1" = busy)
Idle Condition = open to ground
Busy Condition = metallic ground (with approx. 40 ohm contact protection resistance)
Output Jack: 310 type (tip = A, ring = B, sleeve = ground)

Digital Input:
Standard DS-1 Code (AMI) at 1.544 mb/s rate.
Input impedance 100 ohms ±10%
Input sensitivity - will frame properly at levels as low as -26 dB relative to a standard pulse (+3 volts P-P)

Loop Timing Check:
An "L" will be displayed in the display "FRAME" field if the Digital Xmit Output bit rate and the Digital Receive bit rate do not compare.

Line Measurement Functions:

BPV (Bipolar Violations) - any one or more bipolar violations will be indicated.

Frame Slip Count - any one or more frame bit errors will be displayed. A 4 digit count of errors is provided in the line measurement mode.

Jitter - line jitter greater than 5 UI P-P ±3 UI at 500 Hz will be indicated.

Channel Sequence Coding - selectable for D1D, D2, D3 or D4 (at a DS-1 rate)

Connector: type 310 jack (tip - ring)

2.2 Receive Level Measurement

a. Input range: +3.0 to -60.0 dBm (the display will show >3.0 or <-61 if this range is exceeded)

b. Measurement Accuracy:

Input range:	Accuracy (dB)
Digital Milliwatt	±0.0 dB
+3.0 to -50.0 dBm	±0.1 dB
-50.0 to -55.0 dBm	±0.2 dB
-55.0 to -60.0 dBm	±0.5 dB

c. Deviation with Frequency:
±0.02 dB from 20 Hz to 3980 Hz

2.3 Frequency Measurement

a. Frequency Range: 0 to 3990 Hz

b. Accuracy: ±2 Hz

c. Input Level Range: to -60.0 dBm (No high limit on input level)

2.4 PCM Offset Measurement:
Average offset (in coding steps) calculated with 1000 8 - bit PCM samples.

2.5 Transmit

Analog: VF input: (intended for signaling or speech only.)

Input Impedance: 600 ohms balanced

Input Test Level Point: 0.0 dBm

A 0.0 dBm input signal will result in a 0.0 dBm ±0.5 dB output on a digital basis when measured with an ideal decoder and filter.

Headset Input: will accept type 59 headset (tip-sleeve jacks)

Headset Output Level: nominally -13 dB below the VF input test level point.

Synthesizer Output:
User Selectable:
Digital synthesizer:
freqeuncy range: 0 - 3990 Hz, 10 Hz steps
(send level: +2.9 - 60.0 dBm ±0.1 dB steps
both user programmable from front panel)
Idle channel code: 11111111 pattern

Level Accuracy:

In the range:	dB
0.0 to -40.0 dB	±0.05
-40.0 to -55.0 dB	±0.15
-55.0 to -60.0 dB	±0.20

Frequency Accuracy

In the range:	Hz
10 - 530 Hz	-0, +2
540 - 1330 Hz	-0, +5
1340 - 3990 Hz	±5

Alarm Transmission:
Alarm On: bit 2 suppressed in all channels
Alarm Off: normal operation

A/B Bit Input:
Keyboard or External Control
Keyboard: user selectable logic "1" or "0"
External: tip-ring type 310 jack
tip = A, ring = B, sleeve = ground
tip or ring ground generates "1"
tip or ring open generates "0"

Digital Output:
Standard DS-1 Code (AMI) at 1.544 MB/s rate. ±20 b/s
Output Impedance: 100 ohms ±10%
Output Pulse Level: ±3V P-P Bipolar
Channel Sequence Code: selectable for D1D, D2, D3 or D4
(at a DS-1 rate)
Connector: type 310 (tip-ring)

2.6 Dimensions

13.5" W x 5.2" H x 14.5" L
343mm W x 132mm H z 368mm L

2.7 Weight

15 lbs. 10 oz.
7.1 kilograms

2.8 Environmental

Operating Temperature Range: 0 - 40 °C
Relative Humidity: 0 - 90 non-condensing
Storage Temperature Range: 0 - 70 °C

2.9 Power Requirements

100/220 V ac 50-60 Hz.

3.0 PANEL CONTROLS AND CONNECTIONS

3.1 General

3.1.01 This section describes the functions of each switch, lamp and jack located on the front panel of the Model T308-01A. The description will be broken down into sections relating to power, display, keyboard operation, input/output connections and miscellaneous.

3.2 Power

3.2.01 ON/OFF switch - The ac power switch is located in the lower right corner of the front panel. Application of power may be verified by observing the display area.

3.2.02 Power Receptacle - This 115V ac three prong male plug is recessed in the lower left corner of the rear panel. A line cord is supplied for connecting to a 115V ac outlet. 230V ac operation is available.

3.2.03 FUSE - A one ampere SLO BLO fuse is located next to the power receptacle.

3.3 Information Display

3.3.01 The 40 character fluorescent display prompts the user as to what information has to be entered via the keyboard for the operation to be performed. When power is applied the following display appears:

```
┌──────────────────────────────────────┐
│ WILCOM T308-01A V1.3...XMIT OR REC   │
└──────────────────────────────────────┘
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

3.3.02 Information Display Captions for XMIT and REC - The displayed parameter captions MODE, CH, FREQ, etc. are shown in the following illustration and explained in the text. Abbreviations also are interpreted.

```
┌──────────────────────────────────────┐
│ ORIG 8  1000 -11.1  A=1 B=0  INT OFF │
└──────────────────────────────────────┘
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

NOTE: Refer to Section 4.5 for "Information Display" details.

(1) MODE (One of four modes can be displayed) -

(a) ORIG - Originate mode as depicted above indicates that transmit parameters are being displayed and transmitted.

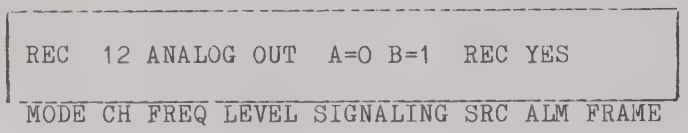
Other modes that can be entered and dispalyed are as follows:

(b) D&I - Drop and Insert mode, described in Section 4.5.03, indicates that the transmit parameters apply to a timeslot that has been dropped and replaced by the T308-01A with data from the T308-01A transmit source.

(c) LOOP - Looped mode, described in Section 4.5.03, indicates that the timing for the T308-01A transmit source has been derived from the digital receive input source.

(d) REC - Indicates that the receive parameters are being displayed.

The REC mode display differs as shown in the following illustration.



NOTE: ANALOG OUT refers to the ANALOG OUT jack.

(2) CH - Indicates the "channel" number selected (between 1 and 24) for use in the function indicated by (1) above. The internal microprocessor automatically translates the selected channel number into the proper timeslot based on the type of coding selected at power up.

(3) FREQ - Indicates the "frequency" of an internally synthesized sine wave if the Synthesizer (SYN) transmit source has been selected. The range of this source is from 0 to 3990 Hz in 10 Hz increments. If a transmit source other than SYN has been selected (i.e., ANALOG INPUT, QUIET, HEADSET or THRU) that source name will be displayed in this area. In addition, this space is used when FREQ COUNT is selected (4.5.03 #7).

(4) LEVEL - Indicates the level in dBm of the frequency displayed by (3) only if SYN has been selected. The level is programmable in 0.1 dB increments from +2.9 to -60.0 dBm. This is the level range which an ideal decoder would provide to an ideal TMS terminated in 600 ohms.

(5) SIGNALING - Presents a display of the state of both the A and B signaling bits for either the digital receive input or for the digital output of the T308-01A.

(6) SRC - Indicates the "source" of the A and B bits that are being displayed whether it be the receive input DIGITAL/REC, IN, the internally generated A/B or the external input provided to the A/B, IN jack.

(7) ALM - An "alarm" on the DS1 bit stream is defined as bit 2 forced low in ALL timeslots. The display will either show ON or OFF for the transmit function or YES or NO for the receive function.

(8) FRAME (BRLTJ) - The presence of *BPV's, framing errors, either terminal or signaling, on the DIGITAL REC/IN jack or the DIGITAL XMIT/IN jack will be indicated by an "R" (receive) or a "T" (transmit) displayed in the FRAME area of the display. This applies to the LOOP and D&I modes. If the two T1 signals (see Sec 1.3) are not in phase, an "L" will be displayed in the FRAME area of the display. If line jitter is present, a "J" will also appear in this display area.

3.4 DATA ENTRY Keys

3.4.01 These keys are used for entry of numeric data and for selection of menu entries. Menu entry examples are discussed in Section 4.5.03.

3.5 FUNCTION SELECT Keys

(1) DISP - Must be followed by REC or XMIT. REC will display receive parameters of importance while XMIT will do the same for transmit parameters. The parameters are unaffected by this key sequence.

(2) REC - Must be preceded by DISP or SETUP.

(3) XMIT - Must be preceded by DISP or SETUP.

(4) SETUP - Pressing this key followed by REC or XMIT will result in a short dialog between the user and the machine resulting in the complete setup of the T308-01A Set.

(5) SCAN - Followed by the A key or the B key, will display all 24 'A' bits simultaneously or all 24 'B' bits simultaneously. This is useful for a display of T1 terminal traffic conditions. Press SET to return from the SCAN function.

(6) A,B - The A and B signaling states are entered in the "INT" mode using the A or B keys preceeded by the A/B key. Three "dashes" must be visible in the "FRAME" section of the display before the A and B keys are effective. The dashes will appear when the A/B key is pressed one or two times.

3.6 MODIFY Keys

(1) CHAN - Brackets the current XMIT or REC channel (Depending on the parameters being displayed.) and allows the user to key in a new channel number.

(2) FREQ - Brackets the current frequency being generated if the XMIT source is SYN (synthesizer) and allows the user to key in new frequencies in 10 Hz steps. Incremental changes (3.7 #1) can be made in 100 Hz steps.

*B = BPV = Bipolar Violation

(3) LVL - Brackets the current level at which the selected frequency is being generated and allows the user to key in a new level if desired. Incremental changes (3.7 #1) can be made in 10 dB steps from 0 to -60 dBm. Press LVL twice to change from - to + or + to -.

(4) ALM - Press twice to activate alarm. Refer to 3.3.01 (7).

(5) A/B - If external signaling has been activated, pressing this key twice will effect a change to the internal signaling mode and allow 'A' or 'B' signaling to be toggled by pressing the 'A' or 'B' keys. If in the internal mode, pressing this key twice will switch the set to the external mode where the signaling bits are taken from the external A/B input jack. The external (EXT) and internal (INT) designations should be observed on the fluorescent display as the changes are effected. Refer to 3.5 (6).

3.7 Incremental Changes

(1) △,▽ - Pressing either of these keys after the FREQ or LEVEL key has been pressed will increment the frequency or level up or down. Zero to 3990 Hz for frequency; -60 dB to +0 dB for level. (Refer to 3.6).

(2) △,▽ - Pressing either of these keys after the CHAN (channel) key has been pressed will increment or decrement the REC but not the XMIT function.

(3) △,▽ - Pressing this key after pressing < SETUP > < XMIT > or <SETUP > < REC > allows stepping thru the XMIT & REC menu's without changing selections already made.

3.8 SET

3.8.01 Channel, frequency, level or signaling changes must be terminated by pressing the SET key. Also, press SET to return from the SCAN function. Press SET to remove brackets.

3.9 T308-01A Jackfield

3.9.01 The jackfield is the means for gaining access to the transmit and the receive sections of the T308-01A Channel Access Set. All are 310 jacks except the HEADSET jacks.

3.9.02 The DIGITAL REC, IN/OUT jacks are connected in parallel. They are color coded blue and normally associated with the ANALOG, OUT and/or A/B, OUT jacks also coded blue. The circuit connections can be traced by referring to the Simplified Block Diagram of Figure 4-1. Also refer to Section 4.2.

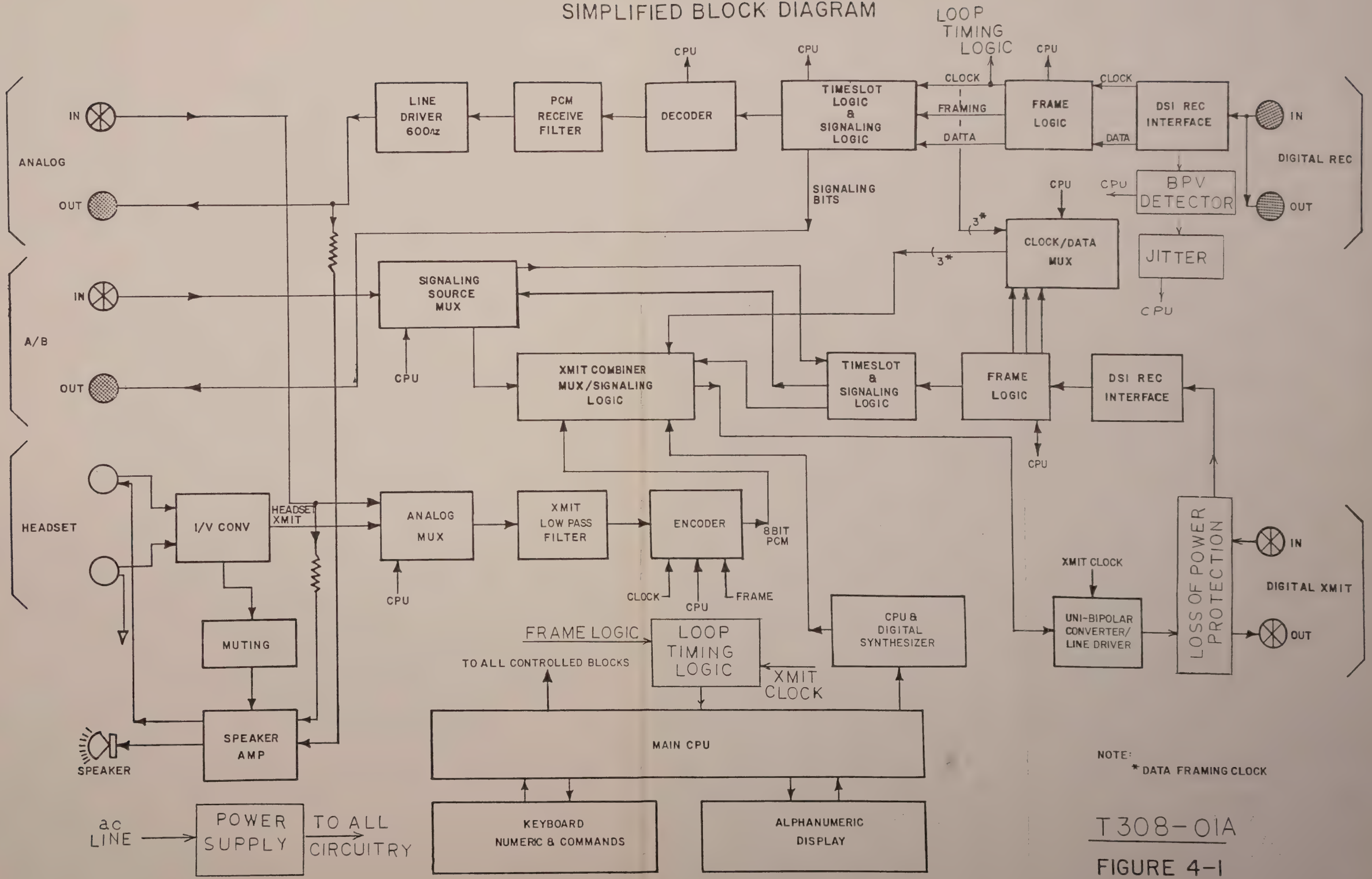
3.9.03 The DIGITAL XMIT, IN/OUT jacks are color coded red and normally associated with the ANALOG, IN and/or A/B, IN jacks also coded red. As in 3.9.01 the circuit connections can be traced by referring to Figure 4-1. Also refer to 4.3.

3.9.04 The HEADSET jacks are W.E. Co. 52A for use with compatible headset plugs. The internal speaker is muted when the plugs are inserted.

3.9.05 The LEVEL control adjusts the volume of either the speaker or the headset.

3.9.06 ANALOG - The ANALOG-OUT jack presents the decoded Voice Frequency (VF) information in analog form for use with a noise or level measuring set. The ANALOG-IN jack accepts an external VF analog signal to be encoded by the T308-01A for digital transmission.

SIMPLIFIED BLOCK DIAGRAM



NOTE:
* DATA FRAMING CLOCK

T308-01A

FIGURE 4-1

4.0 OPERATION

4.1 Power

4.1.01 115V ac 60 Hz power is applied to the set using the line cord. The ON/OFF switch is located in the lower right corner of the front panel.

4.2 DS-1 Digital Receive Connections to PCM Carrier Systems

4.2.01 General - The Wilcom T308-01A PCM Channel Access Set is designed for precise testing of PCM systems operating at a 1.544 Mb/sec rate. The set can decode one user selected channel, presenting a VF analog output for conventional level and noise measurements, measurements of gain tracking and frequency response. It also provides for display of signaling information on a per channel or 24 channel basis, or output on a per channel basis.

4.2.02 The Receive functions that can be performed are as follows:

1. Decode a user selected channel in the DS-1 bit stream (1.544 Mb/s).
2. Present the decoded channel in analog form.
3. Provide for CCIS or NORMAL decoding.
4. Display the signaling status for the A/B bits.
5. An output jack is provided for signaling information.
6. Display the status of all 24 channels in SCAN mode.
7. Provide a loudspeaker output for the decoded channel.
8. Provide a headset output for the selected channel.
9. Measure and display the VF level frequency and PCM offset of a waveform in the selected channel.
10. Decode and display suppression of bit 2 as an alarm condition.
11. Select D1D, D2, D3 or D4 channel sequence.
12. Select CCIS or NORMAL decoding.

4.2.03 User commands and channel numbers are entered via the keyboard. The fluorescent display shows the entered commands and prompts the operator for further necessary information as required for the operation. For example the channel number, frequency, level, etc. An entry procedure example is shown in Section 4.6. Section 4.5 defines the displayed characters.

4.2.04 The digital receive (DIGITAL REC) and associated jacks, ANALOG OUT and A/B OUT, are coded blue on the front panel. The nomenclature can best be understood by using an actual example, Figures 4-2 and 4-3, as well as referring to the Simplified Block Diagram of Figure 4-1. Both figures show how the jacks are interrelated. In the Block Diagram the DIGITAL REC, IN(OUT) jacks* can be traced to the ANALOG, OUT and A/B, OUT jacks. An actual set up at a digital switch or channel bank is shown in Figure 4-2 or 4-3.

*These two jacks are connected in parallel.

The DIGITAL REC, IN jack on the T308-01A is connected to the MON (PCM OUT) jack of the DSX-1 ACCESS jacks associated with a Digital Switch or Channel Bank in a Telephone System. The digital signal is decoded by the T308-01A and output at the ANALOG, OUT and/or A/B OUT jack as shown.

4.3 DS-1 Digital Transmit Connections to PCM Carrier Systems

NOTE: The DSX jackfield is designated in the following descriptions and drawings. For use with other than a DSX jackfield, consult the engineering drawings for your system layout.

4.3.01 General - The transmit section of the T308-01A has the capability of generating encoded sine waves, idle channel patter (11111111), encoded analog or headset input, or passed thru data in the Drop & Insert mode.

4.3.02 The Transmit functions available are listed below:

1. Synthesize a digital sine wave at the PCM sampling rate and output during a user selected channel.
2. Encode an external analog signal applied to the analog input.
3. Generate an idle pattern (11111111).
4. Encode speech information applied via the headset jack.
5. Suppress bit 2 in the bit stream at user command (alarm simulation).
6. An external jack is provided for application of external A/B signaling information.
7. Allow for keyboard entry of A/B signaling information and internal generation.
8. Provide a digital output at standard DS-1 rate.
9. Provide a digital input to accept standard DS-1 rate for the Drop & Insert function.

4.3.03 Other operator choices are:

1. Selection of D1D, D2, D3 or D4 channel numbering sequences.
2. Selection of CCIS or NORMAL encoding and decoding.

4.3.04 The three transmit modes available in the T308-01A are:

1. Originate mode (ORIG)
2. Drop and Insert (D&I)
3. Loop (LOOP)

(1) ORIG - All timing information is generated by the T308-01A. An entire bit stream is presented at the DIGITAL XMIT, OUT jack, including framing, timeslot information and signaling information for that timeslot.

RECEIVE MODE (IN SERVICE)

MONITOR NEAR END – OUTGOING TRUNKS

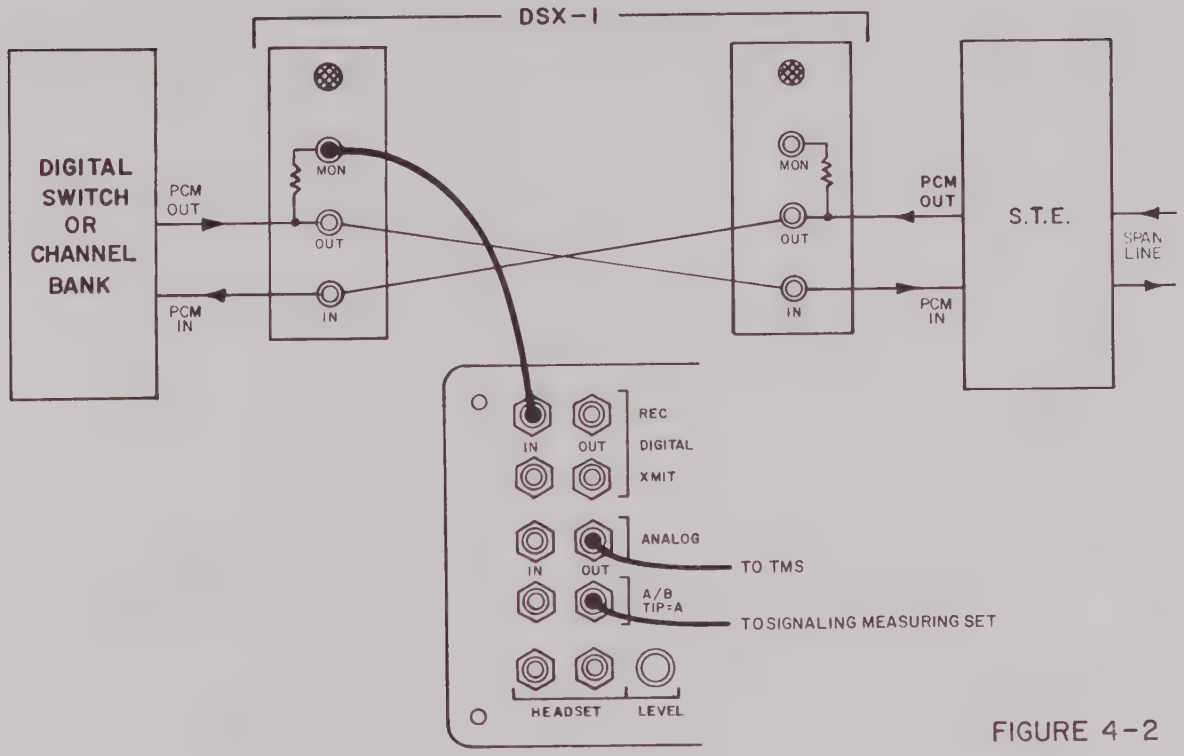


FIGURE 4-2

RECEIVE MODE (IN SERVICE)

MONITOR NEAR END – INCOMING TRUNKS

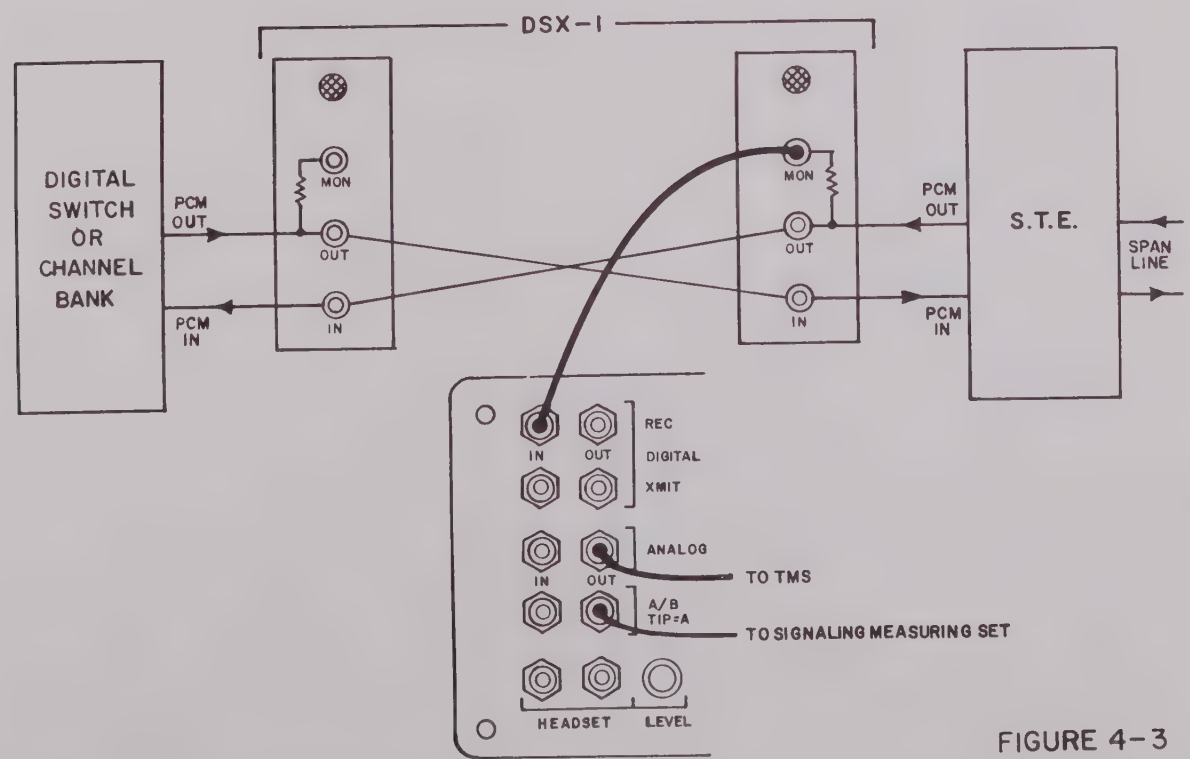


FIGURE 4-3

ORGINATE MODE (OUT OF SERVICE)
SIMULATE INCOMING TRUNKS (5.3.01 ξ 4.6)

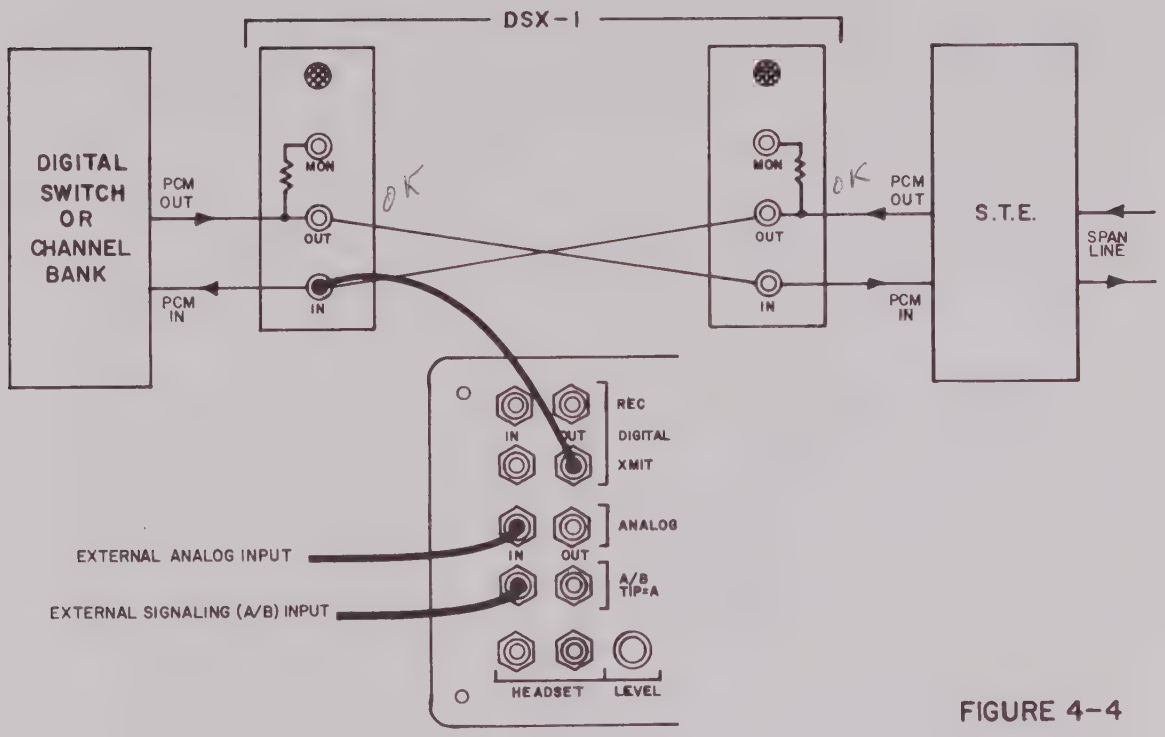


FIGURE 4-4

ORIGINATE MODE (OUT OF SERVICE)
SIMULATE OUTGOING TRUNKS (5.3.01 ξ 4.6)

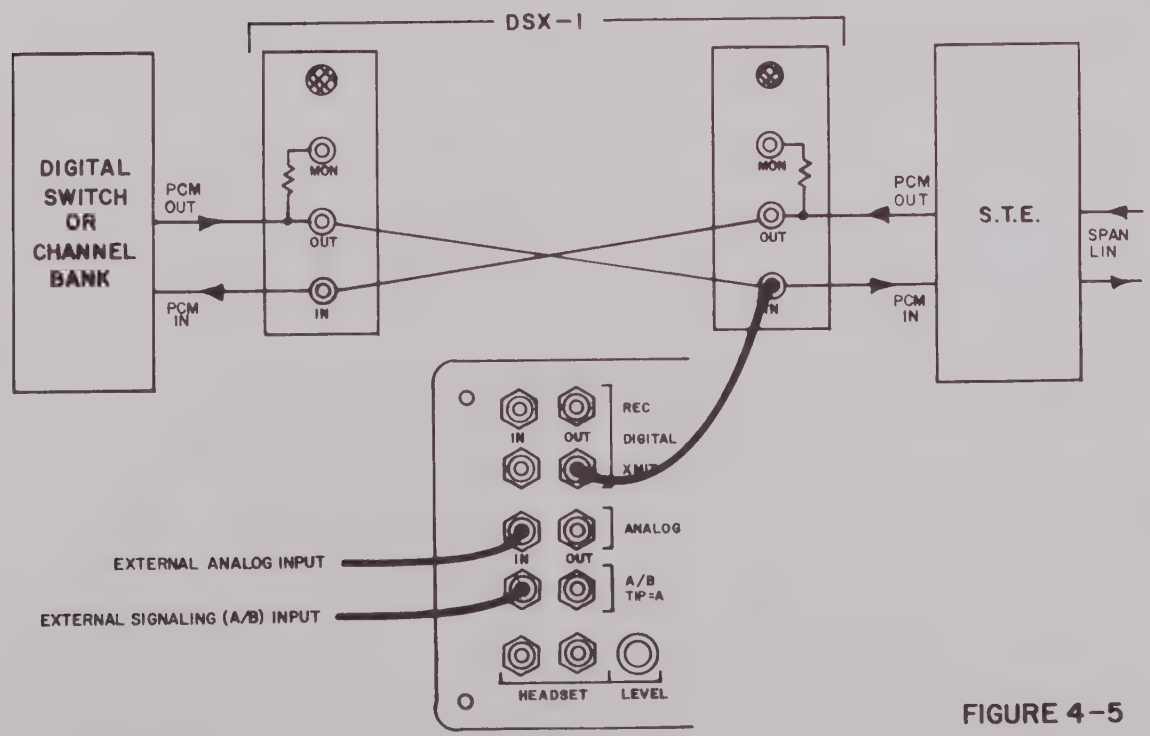


FIGURE 4-5

(2) D&I - Drop and Insert mode - A digital input is applied to the DIGITAL XMIT, IN jack on the T308-01A. The digital output (DIGITAL XMIT, OUT) of the T308-01A presents a bit stream identical to the digital input; except, that the selected timeslot contains information generated or encoded by the T308-01A from one of its selected sources. All timing is derived from the digital bit stream at the digital transmit input.

(3) LOOP - The looped mode is similar to the Drop and Insert mode except that the digital signal is applied to the DIGITAL REC, IN jack. This is useful for applications where the test source provided by theT308-01A must be synchronized to an external source such as a digital switching system. Timing is derived from the received digital bit stream.

4.3.05 The digital transmit (DIGITAL XMIT, IN/OUT) and associated jacks, ANALOG IN and A/B IN, are coded red on the front panel. The nomenclature can be explained using the ORIG mode examples of Figure 4-4 or 4-5. The DIGITAL XMIT, OUT jack on the T308-01A is connected to the DSX-1 ACCESS "IN" jack of the telephone system. Analog information and signaling information to be entered into the bit stream are supplied at the ANALOG IN and A/B IN jacks respectively. The "connection" between the DIGITAL XMIT, IN/OUT jacks and the ANALOG IN and A/B IN jacks can also be seen by referring to the Simplified Block Diagram of Figure 4-1.

4.3.06 In all transmit modes the T308-01A will output a digital signal in the user selected timeslot which corresponds to the internal synthesizer, idle channel code (11111111), external analog input (for inband signaling applications such as MF and Tough Tone*) or headset for communications on the channel under test.

4.4 Internal Synthesizer

4.4.01 The internal synthesizer provides digitally generated sinusoidal signals from 0 Hz to 3990 Hz in 10 Hz increments. The send level is adjustable in 0.1 dB steps from +2.9 dBm to -60.0 dBm.

4.5 Information Display

4.5.01 General - The display is central to the operation of the T308-01A. It is divided into eight areas as shown by captions under the display bezel, Figure 1-1. Also refer to Section 3.3.01.

4.5.02 Transmit and Receive Display - The above mentioned captions refer only to the transmit and receive modes. There are three transmit modes.

1. Originate (ORIG)
2. Drop and Insert (D&I)
3. Loop (LOOP)

and one receive (REC) mode.

*Registered AT&T

4.5.03 T308-01A DISPLAY MENU DEFINITIONS:

(1) POWER UP DISPLAY: WILCOM T308-01A V1.3...XMIT or REC?
Press either XMIT or REC for further setup menus.

(2) Next: (assuming that XMIT has been pressed)
SEND: 1-SYN 2-QUIET 3-INPUT 4-HST 5-THRU

SYN - selects the internal synthesizer as the XMIT source.

QUIET - forces all ones pattern into the selected timeslot. This is a forced idle channel.

INPUT - an analog signal applied to the ANALOG IN jack will be encoded and transmitted in the selected timeslot.

HST - the headset will be activated and any speech presented to it will be encoded and transmitted in the selected timeslot.

THRU - selecting this option in Drop & Insert or Looped modes will allow all channels to pass thru the T308-01A unaffected by any settings. In ORIG mode selecting thru will merely force channel 0 (non-existing timeslot) to be set. No timeslot information will be generated.

(3) Next: XMIT MODE: 1-ORIG 2-D&I 3-LOOP

ORIG - all timing information is generated by the T308-01A. An entire bit stream is presented at the transmit output jack. This includes framing timeslot information and signaling information for that timeslot.

D&I - Drop and Insert mode - a digital input is applied to the digital input jack on the T308-01A. The digital output of the T308-01A presents a bit stream identical to the digital input except the selected timeslot contains information generated or encoded by the T308-01A from one of its XMIT sources.

LOOP - the looped mode is similar to the drop and insert mode except the digital signal is applied to the receive digital input jack. This is useful for applications where the test source provided by the T308-01A must be synchronized to an external source such as a digital switching system.

(4) Next: A/B SOURCE: 1-INT 2-EXT INPUT

INT - the state of the A and B signaling bits may be set by the user from the keyboard and the T308-01A will prompt the user for these entries.

EXT INPUT - the state of the A and B signaling bits is controlled by the front panel A/B input jack where a tip ground will set A=1 and a ring ground will set B=1. An open tip or ring will set A or B equal to 0. This input jack may be used with a pulsing test set to generate dial pulses on the signaling bits (or on/off hook information.

(5) Next: CHAN. NUMBERING: 1-D3/D4 2-D3 3-D1D (see Appendix A)

Once selected, a given channel numbering sequence will be adhered to until the next power up sequence. In general, there should be no need to change the numbering (or bank type) during normal operation.

(6) CODING: 1-NORM (7-5/6) 2-CCIS (8)

NORM - normal decoding of a given timeslot is performed using 6th and 12th frame signaling conventions. The A signaling bit is stripped out of the channel during the 6th frame and the B bit is stripped out during the 12th frame. In all other frames, the full 8 bits are used to represent an analog sample.

CCIS - no signaling information is conveyed during any frame. The full 8 bits of every channel in every frame is utilized for analog sample information.

(7) Next: REC: 1-TRACK 2-SPLIT 3-LEVEL, FREQ, OFFSET

TRACKING - if 1 is selected, the receive channel is automatically set equal to the transmit channel. Every change of the transmit channel will cause a corresponding change in the receive channel.

SPLIT - if 2 is selected, the receive and transmit channels are independent of each other and may be set separately.

LEVEL, FREQ, OFFSET - If 3 is selected the T308-01A displays the level of the received frequency, the frequency itself and the PCM offset of digital information in any one timeslot.

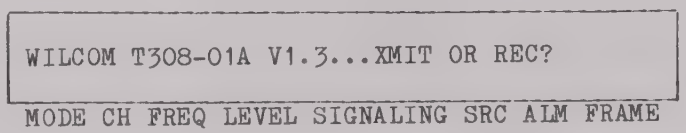
(8) Next: PRESS <SET> to load parameters

Pressing the SET key will cause all information entered up to this point to be loaded into the internal control logic to cause generation, decoding or both.

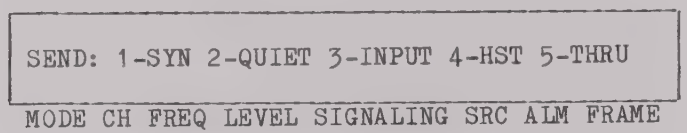
4.6 Typical Entry Procedure

4.6.01 In order to verify that the following procedure has been correctly entered first connect the DIGITAL XMIT, OUT jack to the DIGITAL REC, IN jack with a patch cord. The procedure will then produce a tone at the loudspeaker.

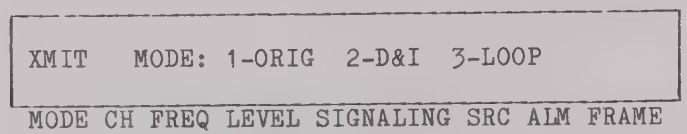
(1) Switch the power ON



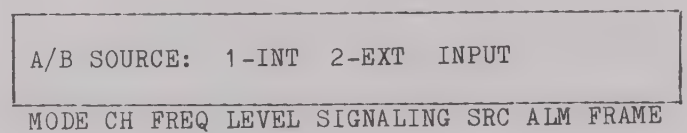
(2) Press XMIT



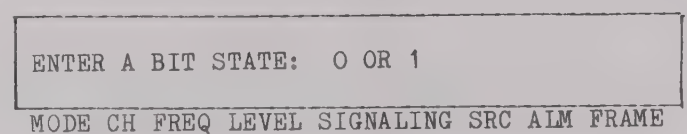
(3) Press 1 for internal synthesizer



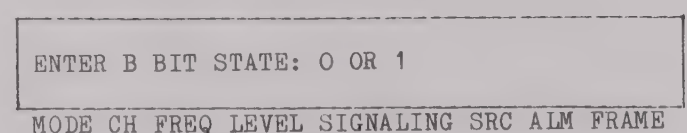
(4) Press 1 to select ORIG mode



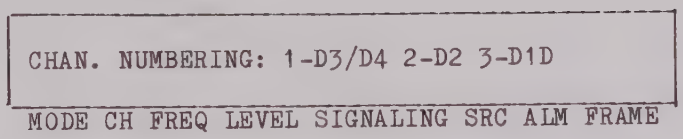
(5) Press 1 for internal



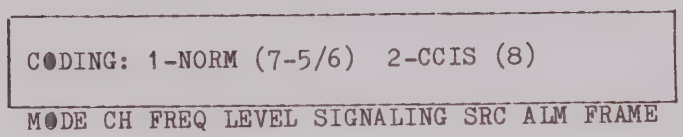
(6) Press 0



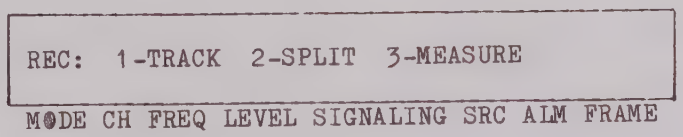
(7) Press 0



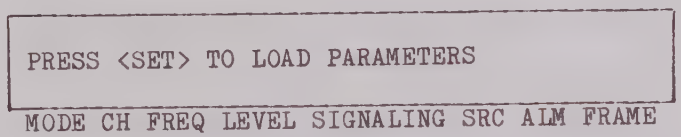
(8) Press 1 for D3/D4



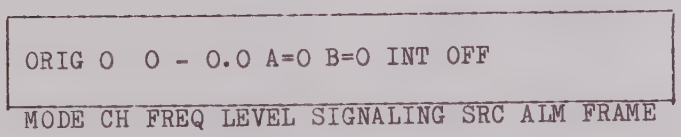
(9) Press 1 to select normal



(10) Press 1 for TRACK(XMIT)



(11) Press SET



(12) Press CHAN

(13) Press 8

(14) Press FREQ

(15) Press 1 0 1 (this results in 1010 Hz)

(16) Press LVL LVL (this results in a + dBm signal)

(17) Press 1 1

(18) Press SET

```
ORIG  8 1010 + 1 1 A=0  B=0 INT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(19) 1010 Hz TONE IN SPEAKER - adjust LEVEL

4.6.02 LINE and CHANNEL MEASUREMENT

(a) Enter the following instructions for channel measurements:

(1) Press SET UP

(2) Press REC

```
REC:  1-TRACK  2-SPLIT  3-MEASURE
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(3) Press 3

```
MEASURE  1 - LINE  2 - CHANNEL
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(4) Press 2

```
REC  8 1013  1.1  PCM OFFSET= - 01
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

4.6.02.01 The display indicates that on channel 8 a tone of 1010 Hz at 1.1 dBm is present and the system has insignificant offset.

4.6.02.02 To change channels, perform a DISP REC command, change the channel and repeat the above SET UP.

4.6.02.03 If a high density of errors or a loss of PCM occurs during measurement, the T308-01A will display the following message.

```
PLEASE WAIT.  FRAMING ERRORS PRESENT
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

After a one second delay it will attempt to reframe.

4.6.02.04 If the above display continues, the user can press DISP REC to get a better indication of the system conditions.

(b) Enter the following instructions for the Line Measurement function:

(1) Press SET UP

(2) Press REC

```
REC:  1-TRACK  2-SPLIT  3-MEASURE
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(3) Press 3

```
MEASURE:  1. LINE 2. CHANNEL
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(4) Press 1

```
FRAME = 0000 BPV = NO JITTER = NO RESET =^
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

4.7 Changes can be made to TRANSMIT & RECEIVE Functions by using the FUNCTION SELECT keys followed by the MODIFY and DATA ENTRY keys. Refer to Section 3.5, 3.6, 3.7 and 3.8.

5.0 APPLICATIONS

5.1 General

5.1.01 Two basic operations are available using the T308-01A, the digital receive and the digital transmit functions 4.5.03 #1. The transmit function is further divided into three modes of operation as follows:

```
XMIT MODE:  1-ORIG  2-D&I  3-LOOP
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

When these are displayed (4.5.03 #3), ORIG is obtained by engaging push button 1, D&I push button 2 and LOOP push button 3.

5.2 Receive Function (REC)

5.2.01 Figure 4-2 and figure 4-3 show how to connect the T308-01A as a digital to analog decoding interface for a transmission measuring set and/or for a signaling measuring set. The DSX-1 access monitor jack at the digital switch or channel bank in the central office is patched to a DIGITAL REC jack on the T308-01A (Figure 4-2 or 4-3). The decoded signals can be monitored at the ANALOG, OUT jack and/or the A/B, OUT jack as shown. Before connecting to the telephone network, set up the T308-01A as follows:

(1) Turn power ON

```
WILCOM T308-01A V1.3...XMIT OR REC?
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(2) Press REC

```
REC:  1-TRACK  2-SPLIT  3-MEASURE
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(3) Press 1 for TRACK XMIT

```
CHAN. NUMBERING: 1-D3/D4  2-D2  3-D1D
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(4) Press 1 for D3/D4

```
CODING:  1-NORM (7-5/6)  2-CCIS (8)
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(5) Press 1 to select normal

```
PRESS <SET> TO LOAD PARAMETERS
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(6) Press SET

```
REC 0 ANALOG OUT A=1  B=1 REC YES RLT
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(7) Press CHAN 7 SET

```
REC 7 ANALOG OUT A=1 B=1 REC YES RLT
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

5.2.02 Tests that can be performed using the T308-01A in the Receive Mode -

Monitor Near End (Outgoing Trunks):

1. Monitor the output of the digital ports of a digital switch.
2. Check the switch for proper timeslot assignment.
3. Check transmission signaling and supervision through the switch.
4. Monitor the DS-1 output of the channel bank.
5. Alignment of channel units and signaling tests from analog input to digital output.

Monitor Far End (Incoming Trunks):

1. Monitor incoming channel supervisory status (on/off hook) of all channels simultaneously.
2. Measure transmission from far end analog input to near end DSX-1 bay.
3. Measure pulsing parameters from far end signaling units to near end DSX-1 bay.
4. Measure parameters from far end to near end.

5.3 Transmit Function Applications

5.3.01 Originate Mode (Out of Service Testing) - The T308-01A when operated in the originte mode (ORIG), figures 4-4 and 4-5, generates the DS-1 bit stream at the DIGITAL XMIT, OUT jack including framing, timeslot information and signaling information for that timeslot. The proper connections to a DSX-1 access monitor jack at a central office digital switch or channel bank are shown in figures 4-4 and 4-5. In the originate (ORIG) mode, the DIGITAL XMIT, OUT jack is attached to the receive side of the system under test at the DSX point. All transmit timing information is generated by the T308-01A using a high frequency crystal controlled time base.

NOTE: Section 4.6.02 shows the T308-01A entry procedure for the ORIG mode.

5.3.02 Tests that can be performed in the Originate Mode - The T308-01A can, on a per channel basis, send a digitally synthesized tone, idle code, external analog input or headset transmission for communications on a selected channel.

Simulate Incoming Trunks (Figure 4-4):

1. Evaluate the performance of channel banks or digital switches prior to turn-up of T-carrier facilities or prior to direct termination of T1 systems at the digital switch.

Simulate Outgoing Trunks (Figure 4-5):

1. Evaluate transmission, noise and signaling performance from near end to far end.

2. Evaluate performance of near end office repeater, T-span line and the far end channel bank or digital switch.

5.4 Drop and Insert Mode (D&I) with Applications for In Service Testing

5.4.01 The T308-01A PCM Channel Access Set in the D&I mode is essentially in series with the outgoing bit stream. System timing is derived from the PCM input. The information on the selected channel is removed (DROP) and replaced (INSERT) with information supplied by the T308-01A. This information may be a digitally synthesized tone, an encoded analog input or the encoded headset input. This is transmitted over the T-carrier system to the far-end. Transmission, noise and signaling problems present on a particular channel can be simulated using the T308-01A allowing sectionalization of the problem.

5.4.02 In-Service Testing on a Working System

CAUTION: Any channel selected for the T308-01A will replace the eight bits transmitted from the terminal in that timeslot with eight bits generated by the T308-01A. Therefore, before the transmit source is selected, the THRU option should be used to see if the T308-01A is locked on to the incoming bit stream.

Proceed as follows:

(A) T308 SET UP PROCEDURE

NOTE: In the procedure that follows, the "display" provides the operator with a choice of push buttons. For this example, they should not be varied.

(1) Connect the set to 115 volts ac and turn the ON/OFF switch ON.

```
WILCOM T308-01A V1.3....XMIT OR REC?
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(2) Press XMIT

```
SEND: 1-SYN 2-QUIET 3-INPUT 4-SHT 5-THRU
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

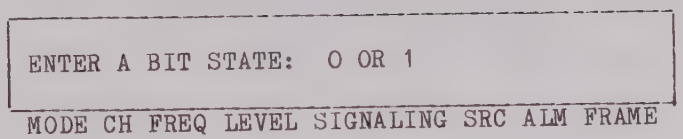
(3) Press 5 to select THRU

```
XMIT MODE:  1-ORIG  2-D&I  3-LOOP
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

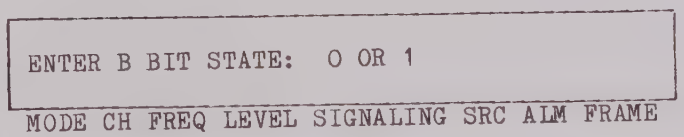
(4) Press 2 for D&I mode

```
A/B SOURCE:  1-INT  2-EXT INPUT
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

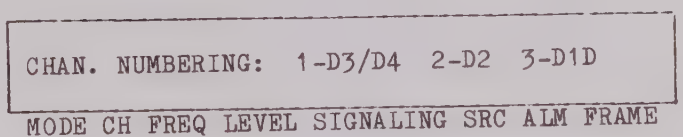
(5) Press 1 for internal input



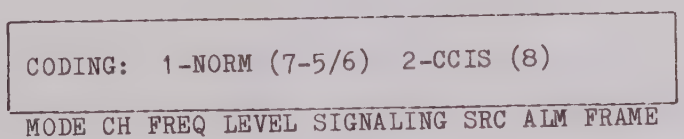
(6) Press 0



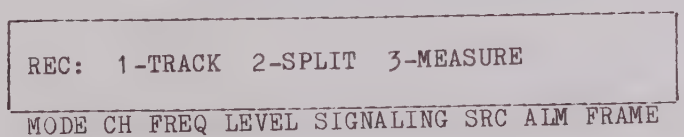
(7) Press 0



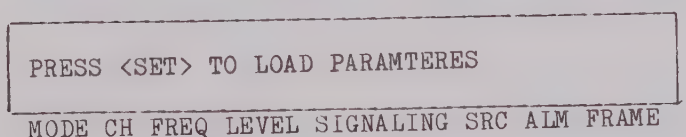
(8) Press 1 for D3/D4



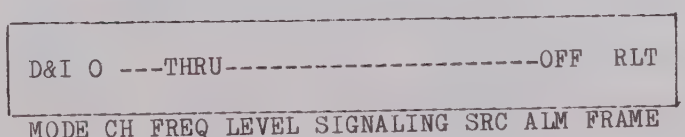
(9) Press 1 to select normal



(10) Press 1 to select TRACK (XMIT)



(11) Press SET



(B) After setting up the T308-01A according to the push button procedure of subsection (A), connect the T308-01A into the telephone system as shown in Figure 5-1 and described below.

The next four steps determine if the T308-01A is "in frame".

(C) Connect "A" Figure 5-1; FRAME indicator T should go out.

(D) Connect "D" Figure 5-1; FRAME indicator R should go out.

(E) Press: DISP REC

```
REC  8  ANALOG OUT  A=0 B=0  REC NO
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(F) Connect "B"; alarm indication stays NO. (The T&R frame indicators are not visible). Indicator "L" should go out in 5 seconds if the far end system is loop timed.

(G) Connect "C" (100 ohm termination).

If the FRAME indicators "R" and "T" turn off as stated in (C) and (D) above and the alarm (ALM) reads "NO" as in (E) and (F), the T308-01A is "in frame" with the DS-1 bit stream.

5.4.03 If it is desired to determine which of the 24 channels are in use first press SCAN A or SCAN B. Usually the channels with either the A or B or both bits equal to zero denote an idle channel.

5.4.04 The next step involves selecting an idle channel for test purposes or trouble shooting.

(1) Press SET UP

```
WILCOM T308-01A V1.3...XMIT OR REC
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(2) Press XMIT

```
SEND: 1-SYN 2-QUIET 3-INPUT 4-HST 5-THRU
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(3) Press 1 for synthesizer

(4) Press SET

DROP & INSERT MODE

SEND TO FAR END–
MONITOR RETURN FROM FAR END
(IN SERVICE TESTING ON WORKING SYSTEM)

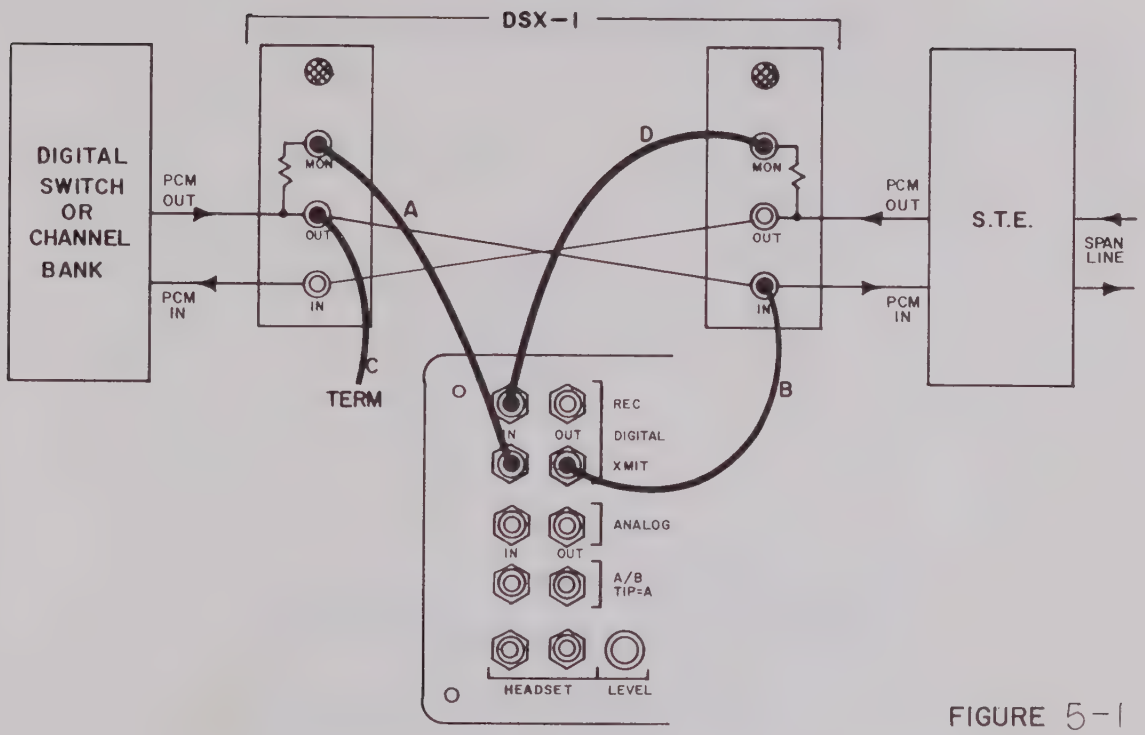


FIGURE 5-1

DROP & INSERT

WITH SUPERVISION & MF TONE SIGNALING

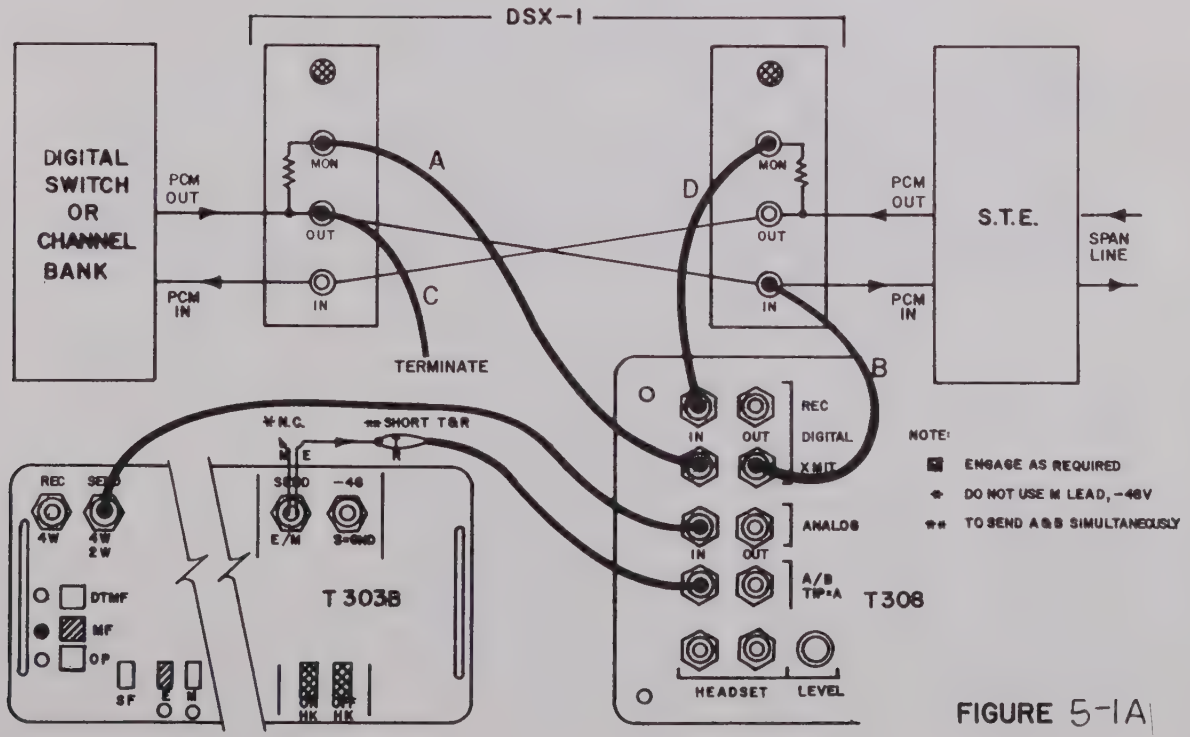
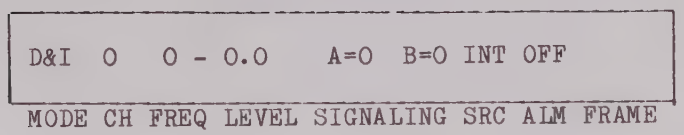


FIGURE 5-1A



(5) Press CHAN

(6) Press 8 (operator's choice)

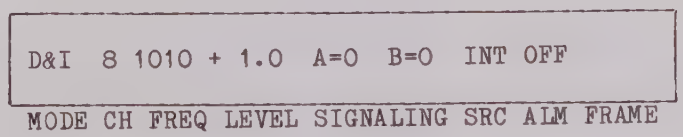
(7) Press FREQ

(8) Press 1 0 1 (operator's choice)

(9) Press LVL LVL (-to + operator's choice)

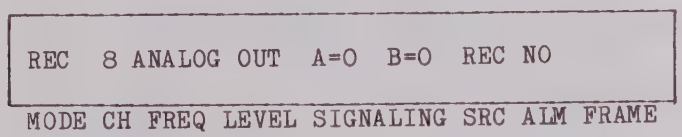
(10) Press 1 0 (level = +1.0

(11) Press SET



5.4.05 If you wish to observe the return supervision condition (wink start) on the selected channel.

Press DISP REC



The A and/or B signaling bits will give a "wink" signal to indicate the change of start between the on-hook and off-hook conditions at the far end. A Signaling Sender such as the Wilcom T303B capable of generating ground (A,B) signals as well as tone signals can be attached to the A/B, IN and ANALOG, IN jacks, Figure 4-6A, and used to seize the circuit. When the far end goes off-hook, the return "wink" can be observed on the A,B bits located above the SIGNALING label on

the T308-01A display. The duration of the "wink" is about 200 milliseconds. A breakdown of the A/B signals during "wink" operation is as follows:

	REC. MODE & A,B SIGNALING DISPLAY	A,B DISTANT TRANSMIT MODE
IDLE ON-HOOK	0,0	0,0
BUSY OFF-HOOK	1,1	1,1
MOMENTARILY RETURN TO	0,0	

(Refer to Section 4.5.03 #4, A/B Source)

5.4.06 Dialing a number on MF Signaling Trunks - The T303B in Figure 5-1A is first used to "dial" a number at a digital central office. It can be, for example, a quiet termination, milliwatt termination or a short. When the distant central office goes off hook the return wink will occur (see section 5.4.04). If a `milliwatt termination' has been dialed, a Transmission and Noise Test Set such as the Wilcom T194C connected to the ANALOG, OUT jack on the T308-01A can be used to make the required measurements. If a `quiet termination' has been dialed, noise measurements can be made using the same test set.

5.4.07 To Disconnect from the System, Figure 5-1 and 5-1A

(A) T308-01A display REC - The alarm (ALM) should read NO.

(B) Remove termination C.

(C) Remove test cord B. There should be no alarm or T,R indication.

(D) Remove test cord A and D.

5.4.08 A summary of typical application is as follows:

(1) Check signaling (A/B) with far end.

(2) On MF signaling trunks, use T303B at ANALOG IN jack to dial milliwatt or quiet termination at far end and make measurements with T194C at ANALOG OUT jack.

(3) With a T326 test line at far end (ie, remote unattended office location) make 2-way loss and noise measurements.

(5) Talk with far end using HEADSET jacks.

5.4.09 Other basic Drop and Insert connections for in-service testing on a working system are shown in Figure 5-2 and 5-3. The T308-01A is connected into the system as follows:

(A) Set up XMIT through D&I as in 5.4.02.

(B) Connect test cord "A"; FRAME indicated T should go out.

(C) Connect test cord "B".

DROP & INSERT MODE
SEND TO NEAR END
MONITOR FROM FAR END
(IN SERVICE TESTING ON WORKING SYSTEM)

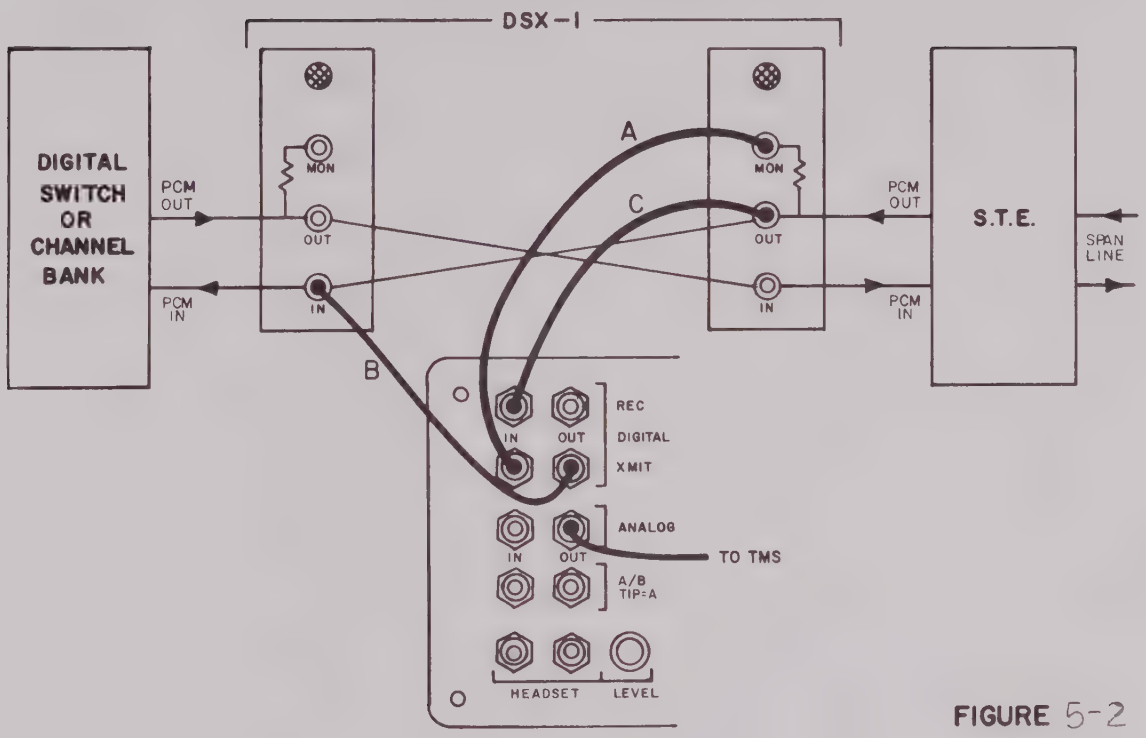


FIGURE 5-2

DROP & INSERT MODE
SEND TO FAR END—
MONITOR FROM NEAR END—
(IN SERVICE TESTING ON WORKING SYSTEM)

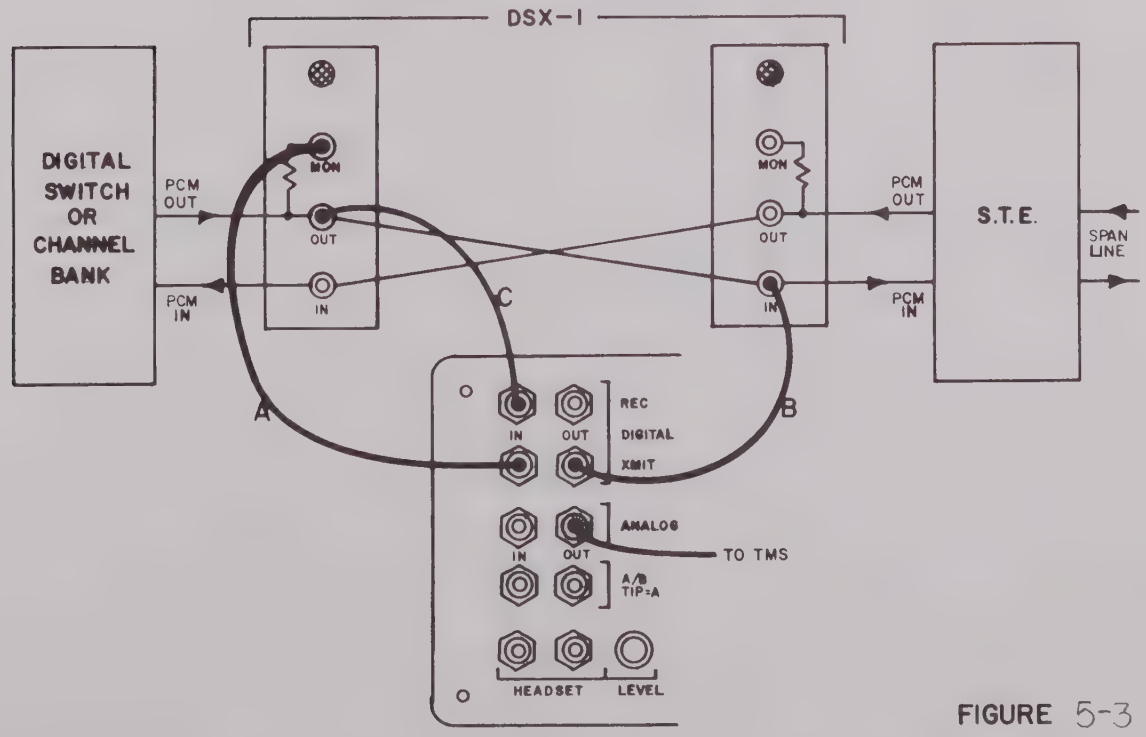


FIGURE 5-3

LOOP MODE (OUT OF SERVICE)

RECEIVE DIGITAL SIGNAL/TIMING FROM NEAR END–
SEND TO NEAR END– (PAR. 5.5)

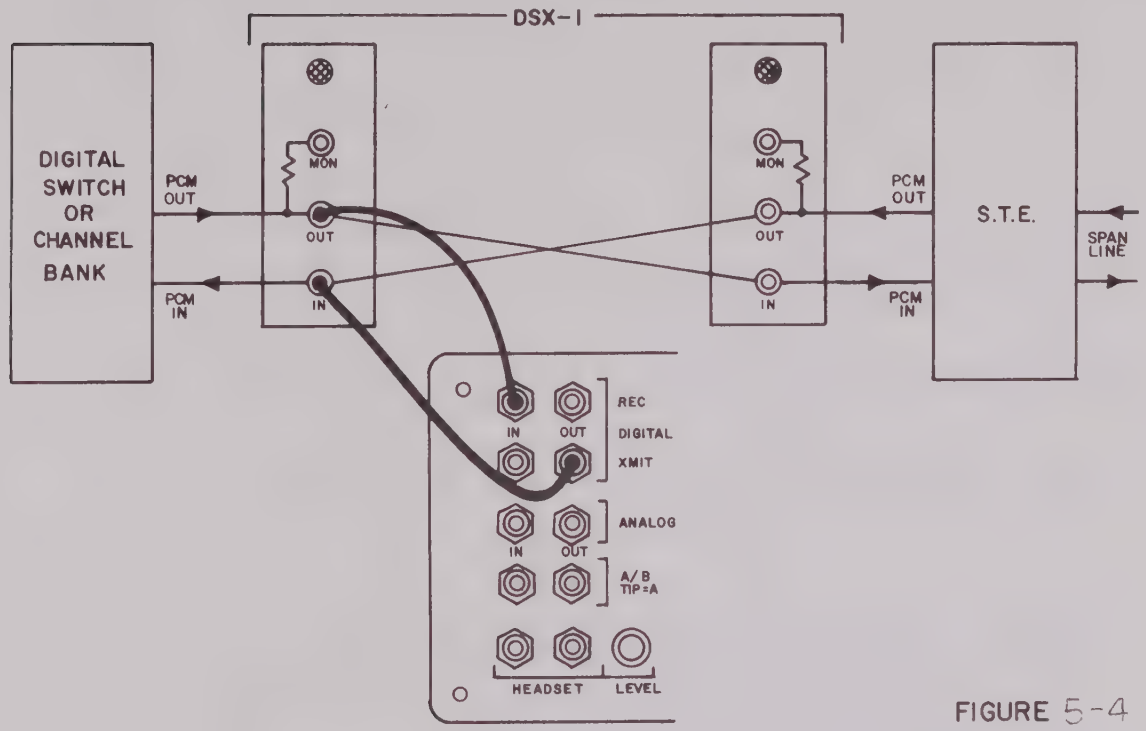


FIGURE 5-4

LOOP MODE (OUT OF SERVICE)

RECEIVE DIGITAL SIGNAL/TIMING FROM FAR END
SEND TO FAR END-(PAR.5.5)

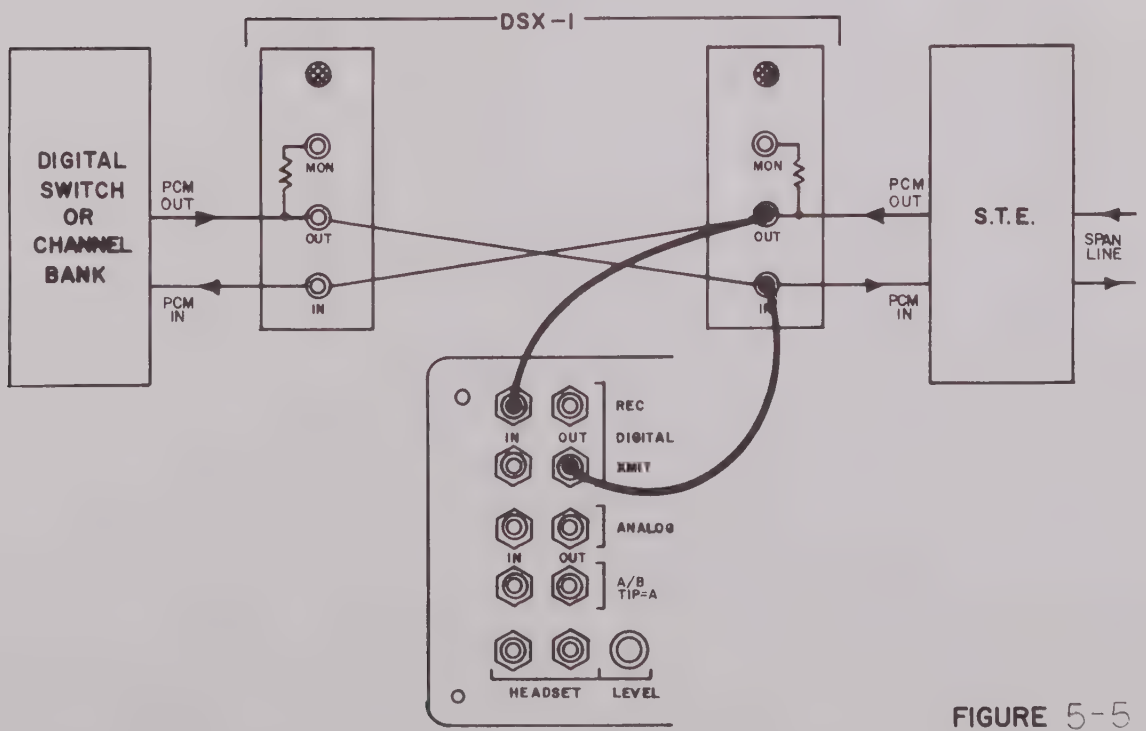


FIGURE 5-5

(D) Connect termination "C". FRAME indicated R should to out.

To disconnect from the system:

(A) Remove termination C.

(B) Remove test cord B.

(C) Remove test cord A.

5.4.10 Typical applications include:

(1) Check selected digital channel analog level (OTLP) and noise by dialing far end milliwatt and quiet termination.

(2) Check near end level alignment by sending digital milliwatt from T308-01A on selected channel.

(3) Check near end equipment noise by sending quiet termination from T308-01A on selected channel.

5.5 Loop Mode (Out of Service Testing)

5.5.01 In this mode the T308-01A is arranged to LOOP the PCM output of a channel bank, digital switch or span line to the PCM input of this equipment. This mode of operation is similar to the DROP and INSERT mode in that the information on the channel selected is removed (DROP) and new information inserted (INSERT) by the T308-01A. This information may be a digitally synthesized tone, an encoded analog input or encoded headset input or idle code. All other channels are passed through unaffected. Refer to Figures 5-4 and 5-5 for the basic connections.

6.0 OPERATIONAL CHECKS

6.1 General

6.1.01 This section will cover the checks that can be made by the operator to verify the operation of the T308-01A. The procedure is intended to check functionality only; it does not verify the specifications.

6.2 Equipment Required

1. VOM
2. Transmission Test Set (TTS)
3. Handset
4. Patch Cords

6.3 Procedure LOOP DIGITAL XMIT OUT TO DIGITAL REC IN

6.3.01 FUNCTION SELECT and DATA ENTRY

(1) PRESS: SET UP, XMIT

```
SEND: 1-SYN 2-QUIET 3-INPUT 4-HST 5-THRU
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(2) Press: 1 - SYN (internal synthesizer)

```
XMIT MODE: 1-ORIG 2-D&I 3-LOOP
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(3) Press: 1 ORIG (originate mode)

```
A/B SOURCE: 1-INT 2-EXT INPUT
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(4) Press: 2 - EXT INPUT

```
CHAN. NUMBERING: 1-D3/D4 2-D2 3-D1D
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(5) Press: 1 - D3/D4

```
CODING:  1-NORM (7-5/6)  2-CCIS (8)
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(6) Press: 1 - NORM (normal)

```
REC:  1-TRACK  2-SPLIT  3-MEASURE
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(7) Press 1 - TRACK (track transmit)

```
PRESS:  <SET>  TO LOAD PARAMETERS
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(8) Press: SET

Enter Values

(9) Press: CHAN

(10) Press: 1

(11) Press: FREQ

(12) Press: 101 (1010 Hz)

(13) Press: LVL

(14) Press: 162 (-16.2 dBm)

(15) Press: SET

The 1010 Hz tone can now be heard.

```
ORIG  1 1010 -16.2  A=0  B=0 EXT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(16) Press: ALM (alarm)

```
ORIG  1 1010 -16.2  A=0  B=0 EXT <OFF>
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(17) Press: ALM

```
ORIG  1 1010 -16.2  A=0  B=0 EXT <ON>
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(18) Press: DISP, REC

```
REC  1 ANALOG OUT  A=0  B=0 REC YES
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

ALM reads YES

(19) Press: XMIT, ALM, ALM, SET

```
ORIG  1 1010 -16.2  A=0  B=0 EXT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

ALM reads OFF.

6.3.02 SIGNALING STATES

(20) Press: A/B, A/B, A , B

```
ORIG  1 1010 -16.2  A=Ø  B=Ø EXT OFF -----
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(21) Press: DISP, REC

```
REC   1 ANALOG OUT  A=1  B=1 REC NO
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(22) Press: XMIT, A/B, A , B

```
ORIG  1 1010 -16.2  A=0  B=0 INT OFF -----
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(23) Press: DISP, REC

```
REC   1 ANALOG OUT  A=0  B=0 REC NO
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(24) Press: SCAN, A↑

```
SCAN A:  01111. 11111. 11111. 11111. 1111
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(25) Press: SET, SCAN, B↓

```
SCAN B:  01111. 11111. 11111. 11111. 1111
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(26) Press: SET, DISP, XMIT

```
ORIG  1 1010 -16.2  A=0 B=0  INT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(27) Press: SET UP, REC, 3,2

```
REC  1  1010□-16.2          PCM OFFSET = 00
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

NOTE: □ = DISPLAY UPDATE INDICATOR

(28) Press: DISP, XMIT

```
ORIG  1 1010 -16.2  A=0 B=0  INT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(29) Press: A/B, A/B

```
ORIG  1 1010 -16.2  A=0 B=0  EXT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(30) At the "A/B, IN" jack, ground the tip to the chassis --- A=1.

(31) At the "A/B, IN" jack, ground the ring to the chassis --- B=1.

(32) Press: DISP REC

```
REC  1  ANALOG OUT  A=0  B=0 REC NO
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(33) At the "A/B, IN" jack, ground the tip to the chassis --- A=1.

(34) At the "A/B, IN" jack, ground the ring to the chassis --- B=1.

(35) Press DISP XMIT and repeat (30) through (34) using an ohm meter to verify that the TIP and RING conditions on the "A/B, OUT" jack follow the conditions applied to the "A/B, IN" jack. Proceed as follows:

1. Ground the TIP of the "A/B, IN" jack. The resistance to ground on the TIP of the "A/B, OUT" jack should be less than 90 ohms.

2. Ground the RING of the "A/B, IN" jack. The resistance to ground on the RING of the "A/B, OUT" jack should be less than 90 ohms.

6.3.03 Level, Measure, Analog In, Analog Out Checks

(36) Press: SET UP, XMIT, 2, SET

```
ORIG 1  ---QUIET---  A=0  B=0 EXT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(37) Press: SET UP, REC, 3, [redacted] 2

```
REC  1  0000 <61              PCM OFFSET = 00
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

(38) Press: SET UP, XMIT, 4, SET

```
ORIG 1  -HEADSET-  A=0 B=0   EXT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

Connect a standard communications headset (handset) to HEADSET jacks. A sidetone should be present; turn LEVEL control counter clockwise.

(39) Press: SET UP, XMIT, 1, SET

```
ORIG 1  1010 -16.2 A=0 B=0   EXT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

Slowly increase LEVEL control; the 1010 Hz tone should be clearly audible. Remove headset.

(40) Press: SET UP, XMIT, 3, SET

```
ORIG 1  ---ANALOG--- A=0 B=0 EXT OFF
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

Apply a 0.0 dBm 1000 Hz tone from a T.M.S. (600 ohm) to the ANALOG IN jack.

(40) Press: SET UP, REC, 3, 2

```
REC  1  1001 0.2              PCM OFFSET = 00
MODE CH FREQ LEVEL SIGNALING SRC ALM FRAME
```

The frequency should be within ±2 Hz, the level within ±0.5 dB and PCM OFFSET 00 ±5 STEPS.

(42) Measure the level at the ANALOG OUT jack into a 600 ohm termination. The level should be ±0.5 dB.

NOTE: These self check procedures do not bring into play the T308-01A Drop and Insert Function nor the D1D and D2 channel translations. To check these, a second T308-01A or similar set is required.

7.0 DIFFERENCE DATA

7.1 General

7.1.01 This section of the manual indicates information relative to changes in circuitry, operation, and features of the Model T308-01A PCM Channel Access Set labeled as follows:

(1) T308-02A
(2) T308-03A
(3) T308-04A

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DANIEL WEBSTER HIGHWAY
P.O. BOX 508 LACONIA. N.H. 03246

DIFFERENCE DATA

PRODUCT T308-02A

ASSEMBLY POWER SUPPLY

CHANGE	DESCRIPTION
(1.)	The T308-02A is functionally identical to the T308-01A except the unit is powered by the C.O. -48V dc power source. The design satisfies those customers who prefer local battery power to 115V ac. This is especially the case for rack mounted units which become an integral part of a test panel. A dc to dc power converter replaces the ac power supply and a WECO 310 type jack mounted on the back of the set replaces the ac power plug receptacle. SPECIFICATIONS: Identical to the T308-01A except for the following: <u>Power</u>: -48 Volts dc ±4 V Typical current: less than 1 amp. Fuse: 3 amp slow-blow Connector: WECO 310 type (rear panel) Sleeve = Ground Tip = -48V dc

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DIFFERENCE DATA

PRODUCT T308-03A

ASSEMBLY INPUT - OUTPUT CONNECTORS

CHANGE	DESCRIPTION
(2.)	The T308-03A is functionally and physically identical to the T308-02A except that the 310 jacks are replaced with Bantam Jacks (also called miniature jacks). An increasing number of digital offices are using miniature jack fields to reduce the space requirement for DSX bays and switching systems. The use of Bantam jacks on the T308-03A provides the customer with a convenient way to patch the test set using Bantam test cords without interfacing with a 310 test cord or making up special 310/Bantam cords. SPECIFICATIONS: Identical to T308-02A except for the following: Input/Output Connectors: Bantam type jacks provided for: Digital Rec - input, output Digital Xmit - input, output Analog Input Analog Output A/B Input A/B Output

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DIFFERENCE DATA

PRODUCT T308-04A

ASSEMBLY INPUT - OUTPUT CONNECTORS

CHANGE	DESCRIPTION

(3.)

The T308-04A is identical to the T308-01A except that the 310 jacks are replaced with Bantam (miniature) jacks. The use of Bantam jacks on the T308 provides the customer with a convenient way to patch the test set using miniature plug cords without interfacing with a 310 plug cord or making up special 310/miniature cords.

The T308-04A is 115V ac powered.

SPECIFICATIONS:

Identical to T308-01A except for the following:

Input/Output Connectors:

Bantam type jacks provided for:

Digital Rec - input, output
Digital Xmit - input, output
Analog Input
Analog Output
A/B Input
A/B Output

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DIFFERENCE DATA

PRODUCT T308-01A

ASSEMBLY Section 2.1
SPECIFICATIONS

CHANGE	DESCRIPTION

LINE MEASUREMENT FUNCTIONS

DELETE: Jitter - line jitter greater than 5 UI P-P ± UI at 500 Hz will be indicated

ADD: Jitter - 2 UI P-P typical

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DIFFERENCE DATA

PRODUCT T308 "A" VERSION

ASSEMBLY LINE MEASUREMENT FUNCTION

CHANGE	DESCRIPTION

The JITTER function is no longer offered in the T308 due to difficulties related to jitter measurement on systems in traffic.

Section 1.4 Line Measurement Function

Delete: (c) Line Jitter - When present in excess, line jitter may cause a repeater section or sections to pass inaccurately regenerated T1 data. While the jitter tolerance requirements of T1 systems are defined by a range of jitter frequencies and amplitudes, the T308-01A presents a go/no-go indication of jitter which has exceeded a predetermined threshold. Refer to the specifications for further information.

Section 2.1 Line Measurement Function

Delete: Jitter - line jitter greater than 5 UI P-P ±3 UI at 500 Hz will be indicated.

Section 4.6.02.04 (4) Press 1 (Display)

Delete: JITTER = NO

Figure 4-1

Delete: JITTER

APPENDIX A

CHANNEL NUMBER/TIME SLOT ASSIGNMENT

Time Slots	D3/D4 (at DS-1 Rate) Channel Assignments	D1D Channel and SLC-96 Number	D1D Channel and SLC-96 Assignments	D2 Channel Number	D2 Channel Assignments
1	1	1			12
2	2	13			13
3	3	2			1
4	4	14			17
5	5	3			5
6	6	15			21
7	7	4			9
8	8	16			15
9	9	5			3
10	10	17			19
11	11	6			7
12	12	18			23
13	13	7			11
14	14	19			14
15	15	8			2
16	16	20			18
17	17	9			6
18	18	21			22
19	19	10			10
20	20	22			16
21	21	11			4
22	22	23			20
23	23	12			8
24	24	24			24

APPENDIX B

"Signaling States in D-Channel Banks" as listed in the following publications.

PUB 43801

Digital Channel Bank Requirements and Objectives
Technical Reference
American Telephone and Telegraph Co.

Channel Unit Type		Office Condition To Channel Unit	Transmit@ Signaling A	Transmit@ Signaling B	Receive@ Signaling A	Receive@ Signaling B	Channel Unit Condition To Office
DPO	XMT	Loop Open	0	0	*	*	*
		Loop Closure	1	1	*	*	*
	RCV	*	*	*	0	*	Normal Battery
		*	*	*	1	*	Reverse Battery
DPT	XMT	Normal Battery	0	0	*	*	*
		Reverse Battery	1	1	*	*	*
	RCV	*	*	*	0	*	Loop Open
		*	*	*	1	*	Loop Closure
4 WE & M 2 WE & M	XMT	M-Lead Grounded, Or Open	0	0	*	*	*
		M-Lead Battery	1	1	*	*	*
	RCV	*	*	*	0	*	E-Lead Open
		*	*	*	1	*	E-Lead Grounded, Or Looped
RPO	XMT	Loop Open	0	0	*	*	*
		Loop Closure	1	1	*	*	*
	RCV	*	*	*	0	1	Normal Battery No Revertive Pulse
		*	*	*	0	0	Normal Battery, Revertive Pulse
		*	*	*	1	*	Reverse Battery, No Revertive Pulse
RPT	XMT	Normal Battery, No Revertive Pulse	0	1	*	*	*
		Normal Battery, Revertive Pulse	0	0	*	*	*
		Reverse Battery	1	0	*	*	*
	RCV	*	*	*	0	0	Loop Open
		*	*	*	1	1	Loop Closure
		*	*	*	0	1	Not Allowed
		*	*	*	1	0	Not Allowed
SDPO	XMT	Loop Open	0	0	*	*	No Sleeve Ground, **
		Loop Closure	1	1	*	*	Sleeve Ground, **
	RCV	*	*	*	0	*	Normal Battery
		*	*	*	1	*	Reverse Battery

@ A And B Signaling Channel States Are Shown As They Exist On The T1 Line.

* Any State Or Condition

** Either Normal Or Reverse Battery.

SIGNALING STATES IN D – CHANNEL BANKS

FIGURE B-1

Channel Unit Type		PBX Or Office Condition To Channel Unit	Transmit @ Signaling A	Transmit @ Signaling B	Receive @ Signaling A	Receive @ Signaling B	Channel Unit Condition To Office Or PBX
FXO	XMT	No Tip Ground, No Ringing	1	1	*	*	*
		Tip Ground, No Ringing	0	1	*	*	*
		Tip Ground, Ringing	0	0	*	*	*
		No Tip Ground, Ringing	?	?	*	0	(Ring Ground)
		No Tip Ground, Ringing	?	0	*	1	(No Ring Ground)
		*	*	*	0	1	Loop Open, No Ring Ground
	RCV	[Tip Ground]	0	*	0	0	Loop Open, No Ring Ground
		[No Tip Ground]	1	*	0	0	Loop Open, Ring Ground
		*	*	*	1	1	Loop Closure, No Ring Ground
		[Tip Ground]	0	*	1	0	Loop Closure, No Ring Ground
		[No Tip Ground]	1	*	1	0	Loop Open, Ring Ground

Channel Unit Type		Station Or PBX Condition To Channel Unit	Transmit @ Signaling A	Transmit @ Signaling B	Receive @ Signaling A	Receive @ Signaling B	Channel Unit Condition To Station Or PBX
FXS	XMT	Loop Open, No Ring Ground	0	1	*	*	*
		Loop Open, Ring Ground	0	1	0	*	(Tip Ground)
		Loop Open, Ring Ground	0	0	1	*	(No Tip Ground)
		Loop Closure, No Ring Ground	0	1	1	*	(No Tip Ground)
		Loop Closure, No Ring Ground	1	1	0	*	(Tip Ground)
		Loop Closure, Ring Ground	1	1	0	*	(Tip Ground)
		Loop Closure, Ring Ground	0	0	1	*	(No Tip Ground)
		*	0	*	1	*	No Tip Ground, No Ringing
	RCV	*	*	1	0	1	Tip Ground, No Ringing
		[Loop Closure]	1	1	0	0	Tip Ground, No Ringing
		[Loop Open]	0	1	0	0	Tip Ground, Ringing

@ A And B Signaling Channel States Are Shown As They Exit On The T1 Line.
* Any State Or Condition
? Indeterminate
⊠ Abnormal Condition With No Application.
[ ] Condition Existing At Distant End Of VF Connection, For Receiver.
( ) Condition Existing At Distant End Of Overall Connection, For Transmitter.

FIGURE B-2

SIGNALING STATES IN D – CHANNEL BANKS

Channel Unit Type	E&M Siganling Circuit Condition To PLR Channel	Transmit @ Signaling		Receive @ Signaling		PLR Channel Unit Condition To E & M Signaling Circuit
		A	B	A	B	
Pulse Link Repeater (PLR)	E Lead Opened	0	0	*	*	*
	E Lead Grounded Or Looped [1]	1	1	*	*	*
	*	*	*	0	*	M Lead Grounded Or Open [1]
4W, 600Ω	*	*	*	1	*	M Lead Battery Or Looped [1]

* Either State Or Condition
[1] Option Selected By Screw Switch
[@] A And B Signaling Channel States Are Shown As They Exist On The T1 Line

SIGNALING STATES IN D – CHANNEL BANKS
FIGURE B-3

Channel Unit Type	DX Circuit Input Condition To Channel Unit	Transmit ❷ Signaling A	Transmit ❷ Signaling B	Receive ❷ Signaling A	Receive ❷ Signaling B	Channel Unit Output Condition To DX Circuit
DX Unit 2W 900Ω 4W 600Ω	On Hook (Idle)	0	0	•	•	
	Off Hook (Busy)	1	1	•	•	
	•	•	•	0	•	On Hook (Idle)
	•	•	•	1	•	Off Hook (Busy)

• Either State Or Condition

❷ A And B Signaling States Are Shown As They Exist ON The T1 Line

Note:

For A Discussion Of The Application Of DX Circuits, See Bell System Technical Journal, November, 1960, pp. 1381-1444.

SIGNALING STATES IN D – CHANNEL BANKS

FIGURE B-4

Channel Unit Type	Station Or Bridging Circuit Input Condition To Channel Unit	Transmit @ Signaling		Receive @ Signaling		Channel Unit Condition To Station Or Bridging Circuit, Non Code Select Mode
		A	B	A	B	
Ringdown 2W, 900Ω 4W, 600Ω	No Ringing Applied To TR Simplex	1	1	•	•	•
	[1] 20 Hz Ringing Burst On TR Simplex [4]	0	0	1	•	No Ringing Applied To TR Pair
	20 Hz Ringing Burst On TR Simplex	1	1	0	•	Ringing Applied To TR Pair [5]
	SG Signaling Lead At Ground Potential	1	1	•	•	•
	[2] SG Signaling Lead At -48 Volts DC [3]	0	0	1	•	Grounded Sensing Relay
						Connected To SG Lead [3]
	SG Signaling Lead At -48 Volts DC	1	1	0	•	48V DC Potential Applied To
						SG Lead [6]

@ A And B Signaling States Are Shown As They Exist On The T1 Line

• Either State Or Condition

[1] Unit Configured For End Station Interface

[2] Unit Configured For Bridging Circuit Interface

[3] SG Lead Used In Bridging Arrangements Is Bidirectional. SG Leads From All RD Units Are Bussed Together. Lock-Out Circuits Allow Only One Unit To Apply – 48V DC To Buss At A Given Time.

[4] Ringing Originates In Ringing Generator Collocated With Station Set.

[5] In Code Select Mode, An End Station Unit Applies A Single 2 Second Burst Of Ringing To TR Pair Only When It Receives The Representation Of A Particular Number Of Ringing Pulses, Equal To A Number (From 1 To 15) Programmed By Switches In Ringdown Unit. Interpulse Intervals Must Be Less Than 2.0 Seconds.

[6] Ringdown Unit At Bridge May Also Operate In Code Select Mode. Unit Reacts To Reception Of Proper Code By Switching SG Lead To -48V DC For 2 Seconds.

SIGNALING STATES IN D – CHANNEL BANKS

FIGURE B-5

Channel Unit Type	Station Condition To Channel Unit	Transmit@ Signaling		Receive@ Signaling		Channel Unit Condition To Station
		A	B	A	B	
Private Line	Loop Open	0	0	•	•	•
Auto Ring (PLAR)	Loop Closed	1	1	•	•	•
2W, 900Ω	Loop Open	0	0	0	•	No Ringing
4W, 600Ω	Loop Open	0	0	1	•	20 HZ Ringing Applied Between
						Tip And Ring [1]
	Loop Closed	1	1	1	•	No Ringing (Loop Closed)
				[2]		No Ringing

@ A And B Signaling Channel States Are Shown As They Exist On The T1 Line
[1] Channel Unit Will Apply Ringing To Station Only If Local Loop Is Open When Receive Channel A Switches From 0 To 1
• Either State Or Condition
[2[During Carrier Failure, Recieve Channel A Forced To "0" (No Ringing) Condition

SIGNALING STATES IN D–CHANNEL BANKS

FIGURE B-6

Channel Unit Type	Input (1) Condition To Channel Unit	Transmit@ Signaling		Receive@ Signaling		Channel Unit Output (1) Condition
		A	B	A	B	
Transmission Only	No Signaling	•	•	•	•	No Signaling
(T.C.) Units						
2W, 900Ω						
4W, 600Ω						
Equalized T.O.	No Signaling	•	•	•	•	No Signaling
(ETO) Unit						
4W, 600Ω						

• Either State Or Condition

(1) Transmission Only Unit Used To Provide Interface Between Two Carrier Links. ETO May Provide Interface Between Carrier And Metallic Extension.

@ A And B Signaling States Are Shown As They Exist On The T1 Line

SIGNALING STATES IN D – CHANNEL BANKS

FIGURE B-7